Maine Department of Inland Fisheries and Wildlife

Lee E. Perry, Commissioner

Fisheries & Hatcheries

Research & Management Report

2002

Caring for Maine's Outdoor Future

Ken Warner, Editor

SPORT FISH RESTORATION

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COOPERATIVE

STATE 

FEDERAL

PROJECT

This report has been funded in part by the Federal Aid in Sport Fish Restoration Program. This is a cooperative effort involving federal and state government agencies. The program is designed to increase sport fishing and boating opportunites through the wise investment of anglers' and boaters' tax dollars in state sport fishery projects. This program, which was funded in 1950, was named the Dingell-Johnson Act in recognition of the congressmen who spearheaded this effort. In 1984 this act was amended through the Wallop-Breaux Amendment (also named for the congressional sponsors) and provided a threefold increase in Federal monies for sportfish restoration, aquatic education, and motorboat access.

The program is an outstanding example of a "user pays-user benefits", or "user fee" program. In this case, anglers and boaters are the users. Briefly, anglers and boaters are responsible for payment of fishing tackle excise taxes, motorboat fuel taxes, and import duties on tackle and boats. These monies are collected by the sport fishing industry, deposited in the Department of Treasury, and are allocated the year following collection to state fishery agencies for sport fisheries and boating access projects. Generally, each project must be evaluated and approved by the U.S. Fish and Wildlife Service (USFWS). The benefits provided by these projects to users complete the cycle between "user pays - user benefits".

Introduction

This is the third in an annual series of Fishing Research and Management reports, including a summary of major management activities in each of our seven Fishery Management Regions. There is also a brief update of some of our fish culture work. Reports are presented in a popular writing style for easier public understanding. Information is presented from field work undertaken in 2001.

Summaries of some of our more specific studies are also included. Lake studies include those on Rangeley, and Chamberlain Lakes. Important studies on the performance of splake in several waters and the performance of two wild brook trout strains in our hatcheries system.

Some insight into the 15-year Long Range Fisheries Plans is also presented. We plan to present more detail in the next Annual Report.

We welcome suggestions for improvement. Please let us know your reactions to this report and whether you find if of interest.

- Peter M. Bourque, Director
Division of Fisheries & Hatcheries

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Sebago Lakes Region (A)

Winter Clerk Census

Early ice-up and cold temperatures throughout the winter provided anglers with safe ice for the duration of the winter season. However, heavy snowfall hampered traveling on many lakes and ponds.

Anglers were surveyed on the following Regional waters last winter: Sebago Lake, Kezar Lake, Highland Lake (Bridgton), Upper & Middle Range Ponds, Bear Pond, Crystal Lake (Gray), Thompson Lake, Mousam Lake, and Little Ossipee Lake. Brief summaries of each survey are provided below, except for Sebago, Kezar, and Thompson which are discussed later in this report under "Special Projects".

Highland Lake (Bridgton) This water was very lightly fished last winter. While most of the catch was comprised of chain pickerel, white perch, and yellow perch, several browns up to 3.5 pounds were landed. The white perch are bountiful and offer better-than-average size quality.

Upper Range Pond (Poland) Lots of largemouth and smallmouth bass were caught. Harvested smallmouths averaged 15.7 inches long, while harvested largemouths averaged 18.7 inches long. Next to bass, brown trout were the most common fish caught, averaging almost 16 inches long and in good health. A handful of lake trout and brook trout were also taken. Moderately light fishing pressure was observed.

Middle Range Pond (Poland) Pickerel dominated the catch, but a good mix of brown trout, brook trout, lake trout, and smallmouth bass were also landed. Lake trout averaged 20 inches long, whereas brown and brook trout averaged 14 inches long. Fishing pressure was moderately light.

Crystal Lake (Gray) Three species of trout provided fair action for winter anglers. Twelve-to-twenty inch brook trout provided most of the action, although lower catches of brown trout produced a few bigger fish in the 14 to 24 inch range. Even several 17 to 18-inch rainbow trout were reported. These rainbows remained from a stocking 4 years ago. Moderate angling use was observed.

Bear Pond (Waterford) Fair fishing was experienced for salmon, lake trout, brook trout, and splake. Anglers continue to catch lake trout up to 3 pounds, even though lakers haven't been stocked since 1995. The salmon catch provided much of the action and those harvested averaged 17 inches long. Bear Pond received light fishing pressure.

Mousam Lake (Acton) This popular water offers angling opportunities for a wide variety of fish. Last winter's survey indicated that brown trout, smelt, smallmouth bass, and chain pickerel were caught most often. Landlocked salmon, brook trout, yellow perch, and largemouth bass also made a significant contribution to the fishery. Few lake trout and white perch were caught. Harvested brown trout averaged about 15 inches long, whereas landlocked salmon averaged 16 inches long. Both the brown trout and salmon fisheries are largely comprised of 2 and 3 year-old fish. The largest fish observed was a 23.5 inch lake trout.

Little Ossipee Lake (Waterboro) This is another popular water that provides good angling opportunities for a variety of gamefish. The hook and line fishery for smelt continues to draw anglers to this water, although experienced anglers reported only fair numbers of smelt, down from the previous year. This appears to be the first year that white perch, a relative newcomer to this water, made a strong appearance in the fishery. In fact, about twice as many white perch were caught than landlocked salmon. The white perch were unusually large and commonly caught up to 14 inches long. Most of the salmon harvested averaged slightly less than 17 inches long and were in fair condition. Relatively recent illegal introductions of several new species, including white perch and cusk have compromised efforts to rebuild the smelt and salmon fisheries.

Summer Sampling

Bass

Region A continues work with the other Fisheries Management Regions in a coordinated effort to address statewide bass management needs in Maine. There are two ongoing statewide bass research projects designed to:

(1) Understand the relationship between bass size at the end of their first growing season, overwinter mortality, and year class strength; and

(2) evaluate the effectiveness of the 12-inch minimum length limit that was adopted in 1992.

In addition to projects of statewide focus, bass information was also collected to address Regional management needs. Baseline information was gathered from bass populations associated with the Skelton Hydroelectric Impoundment on the Saco River and Lake Arrowhead, which is located on the Little Ossipee River. Information collected on bass age and growth, as well as, population size structure will provide a basis to evaluate possible future changes associated with hydro-project operations and possible impacts resulting from efforts to restore migratory fish species to the Saco River watershed.

Stream Inventory Program

As part of an ongoing project, Region A staff has been collecting baseline data on Regional streams and entering this information into an electronic database. Almost every USGS perennial stream in York, Cumberland, Androscoggin, and Sagadahoc counties has been sampled at one or more locations, and we are now focusing our efforts on Oxford County. This summer we were able to sample all of the streams located in the Towns of Greenwood and Stowe, and a few in Norway. Currently, we have logged 2,462 stream sampling events, which cover 916 different streams throughout the Region. Based on the sampling completed to date, 53.3% of the streams in Region A support wild populations of brook trout (Table 1)

Table 1. Number & Percentage of Wild BKT Streams by County

County	No. of Streams Sampled	No. (%) of Sampled Streams with Wild BKT
Androscoggin	73	33 (45.2%)
Cumberland	305	145 (47.5%)
Oxford	223	169 (75.8%)
Sagadahoc	36	4 (11.1%)
York	279	138 (49.6%)
Totals	**916**	**489 (53.3%)**

Fall Netting

Peabody Pond (Sebago) Annual monitoring of the salmon fishery revealed considerable increases in average length, weight, and condition. On average, the salmon are 2 inches longer and about ¾ of a pound heavier than last year, and are some of the biggest salmon we've seen at Peabody (Table 2.). Good smelt runs the last few years have resulted in exceptional salmon growth. This is the first year we've captured older salmon up to 4 years of age. Some of these 4 year-olds were as large as 5 pounds! Salmon fishermen are expected to land some handsome fish next spring, but the number of salmon available to anglers will always be limited by the small size of the pond.

Table 2. Peabody Pond fall netting for landlocked salmon

Mean	Year			
	1995	1997	2000	2001
Length (inches)	16.1	17.6	19	21
Weight (pounds)	1.7	1.8	2.7	3.4
Condition (K)	0.87	0.88	1.01	0.98

Broken Bridge and Crocker Ponds (White Mountain National Forest) These ponds were treated with rotenone in 2000 to eradicate abundant populations of trout competitors, including brown bullheads, golden shiners, pumpkinseed sunfish, and chain pickerel. In the spring of 2001, both ponds were restocked with 10-inch brook trout. The newly created trout populations were sampled this past fall. Brook trout appeared to be numerous in Broken Bridge, averaging 11 ½ inches long, and observed to be in very good condition. We expect this water will produce some 2-pounders within the next few years. We were also pleased to see that a few brook trout survived the unusually warm and dry summer at Crocker Pond, which offers less growth and carry-over potential than Broken Bridge.

Special Projects

Sebago Lake

Salmon As expected, the open water salmon fishing at Sebago Lake was somewhat disappointing this season. Salmon growth has slowed considerably due to the lack of smelts and most of the catch comprised of fish in the 13-17 inch range. Salmon, which should have been 16-18 inches last spring, were barely 15 inches, and fish over 2.5 pounds were rare. In addition, slower salmon catch rates resulted from reduced stocking rates over the last 2 years. More of the same is expected next summer, and stocking rates may be reduced even further. Although summer use and catch information for 2001 is not yet available, indications are that use and salmon catch is down from last year (Table 3).

Table 3. Catch (kept + released) of legal salmon at Sebago (summers)

Year	# Anglers	Salmon Catch
1998	32,494	4,874
1999	33,000	13,320
2000	26,443	7,977

Lake Trout The fast-paced fishing for lake trout continues to draw ice fishermen to Sebago. Unusually good ice conditions persisted through the entire season, combined with good numbers of hungry lakers made for some great fishing. Each winter several lakers in the 15-20 pound range are taken by anglers, and last winter was no exception.

In February, the Windham Rotary Club organized the first lake trout fishing derby on Sebago. Although the weather didn't cooperate and the fishing was slower than expected, the derby was a resounding success. Twenty-three-hundred tickets were sold and approximately 1200-1500 lakers were taken as a result of the event. Area businesses were bustling, thousands of dollars were raised for charity, and a good time was had by all. Perhaps more importantly, our goal to increase the harvest of lake trout was achieved. We would personally like to congratulate and thank Tom Noonan and the Windham Rotary Club for a job well done. We have been involved with countless derbies and other fishing events, but have never witnessed one as well organized and cleverly planned as this one. Incidentally, a portion of the derby proceeds were donated to the Fishery Division for use on southern Maine fisheries projects. This donation has funded new hydro-acoustics gear for Sebago's smelt monitoring project and a digital camera to improve our education and outreach efforts. We may also use these monies to fund a plankton study at Sebago Lake. The Windham Rotary is planning to hold another ice fishing derby at Sebago in 2002.

Open water fishing for lake trout was very good for the first half of the fishing season, but slowed during the last half. Typical of the last few years, most lakers were in the 2-4 pound range, but many fish over 10 pounds were caught this summer. Although summer use has been declining, the lake trout catch has remained relatively high (Table 4). Summer use and catch information has not yet been compiled for 2001.

Table 4. Catch (kept + released) of legal lake trout at Sebago (summers)

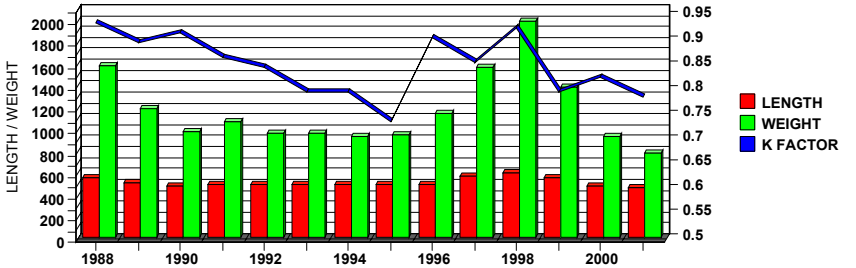
Year	# Anglers	Lake trout Catch
1998	32,494	17,002
1999	33,000	13,396
2000	26,443	16,086

Smelts We had hoped for a better smelt run in the spring than we observed. As a result, several million smelt eggs were again stocked into the lake in hopes of speeding up the smelt recovery. We would like to increase the number of smelt eggs transferred into Sebago next spring, if possible.

An intensive survey of Sebago's smelt population was conducted this summer using our new hydro-acoustics sonar gear. This data will be compared with last year's data, as well as future data to assess trends in smelt abundance.

Jordan River Adult salmon that enter the Jordan River fish collection facility are monitored annually. This year length and weight data from 207 salmon were collected, which is a dramatic increase over last year (62 fish). Despite the presence of more fish, we are very concerned about the continued decline in growth. The salmon at Panther Run were the smallest observed in the past decade. Growth trends for three-year-old male salmon are shown in Figure 1.

Figure 1
AGE 3 MALE SALMON, JORDAN RIVER



Crooked River Monitoring Annual monitoring of wild salmon production in the Crooked River, Northwest River, and Mile Brook indicated relatively high numbers of salmon parr (1 ½ years old) present at all monitoring locations (Table 6). These fish will begin dropping into Sebago next spring. However, very few young-of-the-year (YOY) salmon were caught at any of the locations. This information indicates that while spawning success was good in 1999, very few salmon spawned successfully in 2000. In addition, the summer drought reduced the available habitat for salmon that hatched this spring, thereby further reducing growth and survival of this year class.

Table 6. Crooked River LLS Population Estimates by Year

Site	Age Class	Year			
		1998	1999	2000	2001
Edes Falls	YOY	32	221	39	2*
	Parr	82	55	140	97
Albany	YOY	13	0	44	0
	Parr	101	93	36	107
Mile Brook	YOY	ND	3*	132	0
	Parr	ND	29	24	122

* unable to calculate population estimate, too few YOY caught

Stocking & Regulations Salmon stocking was reduced to 4000 in 2001, and will remain at 4000 or fewer until the smelt population rebuilds. Additional liberalization of the lake trout regulations will further reduce smelt predation and enhance togue size quality. In 2002, anglers will be able to harvest 6 togue. The minimum length will be 14 inches and only one fish over 23 inches may be kept.

Standish Boat Ramp Early this fall the Town of Standish and the Portland Water district closed the Standish Boat launch due to concerns of terrorism and potential impacts to public drinking water. At this time, we are uncertain when the site will be reopened for public use.

Thompson Lake (Oxford) Winter fishing for lake trout was relatively good and anglers commonly caught lakers in the 14-25 inch range. Lake trout were observed to be in poor condition. Anglers took advantage of the new regulation changes on lake trout by harvesting fish in the 14-18 inch range. The ability to use live bait also attracted many anglers that had stopped fishing Thompson. Very few landlocked salmon were caught and harvested in March.

Many of our salmon waters were quick to warm up this spring following a late ice-out, and Thompson Lake was no exception. As a result, the flurry of salmon action that typically accompanies ice-out never really developed. The transition from spring to summer was rapid. As in the recent past, the summer fishery for lake trout continues to be lightly utilized due to a preference for salmon fishing and the availability of better lake trout fishing opportunities nearby.

Adult landlocked salmon in Thompson Lake were netted this fall as part of an ongoing monitoring program to assess the health of this important Regional fishery. The salmon were in very good condition and average length, weight, and condition have improved considerably over last year (Table 7). Salmon observed in the fall of 2001 are some of the fattest seen in recent years, with salmon averaging 0.4 pounds heavier than last year. A reduced spring stocking rate and the presence of a large crop of juvenile smelts have stimulated salmon growth. Older salmon up to 4 years of age were also captured, and these fish averaged 21.7 inches long and just over 4 pounds! Most of the adult fishery is comprised of 2 and 3 year old salmon, which averaged 18 ½ inches long and 2 ¾ pounds. Next spring (2002) anglers should expect slightly lower catches of salmon, but those landed will be fat and scrappy.

Table 7. Mean lengths, weights, and condition for landlocked salmon netted at Thompson Lake

	Year				
Mean	**1997**	**1998**	**1999**	**2000**	**2001**
Length (inches)	20.1	18.8	18.7	18.6	18.7
Weight (pounds)	3.2	2.4	2.5	2.2	2.6
Condition (K)	1.05	1.00	1.05	0.91	1.08

Kezar Lake (Lovell) The results of a winter clerk survey indicated an abundance of lake trout, which provided fast fishing for 2-5 pound fish. Occasionally lakers in the 8-pound range were also reported. The low number of salmon in the winter catch is of concern. Netting and electrofishing studies over the last 2 years have also indicated low salmon abundance, although the few salmon present are in exceptional condition. Unusually large salmon in the 7-8 pound class are also present in the fishery. Because of these characteristics, Kezar Lake was selected as one of several waters within the state to be managed for quality salmon.

Because lake trout are abundant and may be competing with salmon, lake trout were not stocked in 2001, and will not be stocked in 2002. We expect to resume

lake trout stockings in 2003, but perhaps at a lower rate. Even with reduced stockings good fishing for lake trout should continue and increases in the average size of the catch is expected.

Rainbow Trout Study

Rainbow trout were stocked this spring as part of a statewide study to evaluate their performance in Maine waters. Approximately 10,000 rainbows (RBT) were stocked in conjunction with equal numbers of either brook (BKT) or brown trout (BNT) to compare relative performance. Following is a list of study waters stocked this spring and the species comparisons being conducted:

Water Stocked	Town	Species
Upper Androscoggin R.	(Bethel/Gilead)	– BNT/RBT
Kennebec R.	(Shawmut area)	– BNT/RBT
L. Androscoggin R.	(Oxford-Auburn)	– BNT/RBT
Swift R.	(below Coos Canyon)	– BNT/RBT
Lily P.	(New Gloucester)	– BKT/RBT
Long P.	(Denmark)	– BKT/RBT
Jaybird P.	(Hiram)	– BKT/RBT
Overset P.	(Greenwood)	– BKT/RBT
Crystal L.	(Gray)	– BNT/RBT
Middle/Upper Range P.	(Poland)	– BNT/RBT
Megunticook L.	(Camden)	– BNT/RBT
L. George	(Canaan)	– BNT/RBT

This is a big project and due to limited resources we are encouraging angler participation in our data collection efforts. Anglers fishing the above waters should fill out cards at the voluntary census boxes or contact us about keeping a personal fishing log.

Several of these study waters were netted this past fall, including Long Pond, Lily Pond, and Overset Pond. This initial round of sampling was undertaken, in part to determine which sampling methods work best for capturing rainbows. We were pleasantly surprised at the effectiveness of the electrofishing boat at Long Pond (Denmark), where rainbows up to 12 inches were captured. The largest rainbow captured this fall was taken in Lily Pond (New Gloucester). This fish measured 15.7 inches long and weighted 1.4 pounds.

Overset Pond was reclaimed in 1998 and has since been managed for brook trout. Fall netting results revealed the presence of three ages, with 3-year-old trout up to 15 inches long. This spring rainbows were stocked for the first time, and those captured this past fall were observed to be in good health and up to 14 inches long.

Regional Splake Study

In 1999, all 12 Region A splake waters were sampled to evaluate growth, age class distribution, and relative abundance. This assessment effort was undertaken, in part, to determine why splake performance has been somewhat inconsistent from year to year on some waters. In addition, a more careful assessment of habitat suitability and public access was also undertaken. As a result of the work completed in 1999, stocking changes were implemented in 2001.

Table 8. Splake stocking changes on Region A waters.

Increase	Decrease	Same	Discontinue
Tricky Pond (Naples)	Keewaydin Lake (Stoneham)	Shagg Pond (Woodstock)	Highland L. ake (Falmouth)
Stanley Pond (Hiram)	Canton Lake (Canton)	Indian Pond (Greenwood)	Trout Pond (Stoneham)
Colcord Pond (Porter)	Bear P. (Waterford) North P. (Sumner) Bryant P. (Woodstock)		

Stocking was discontinued at Highland Lake (Falmouth), due to the limited availability of suitable summer habitat. Limited walk-in public access to Trout Pond (Stoneham) was not conducive to fishing for splake, and as a result, splake stocking was suspended. Splake stocking rates were reduced on four waters where growth and condition was sub-optimal, but survival and relative abundance was good. Stocking rates were increased on three waters where growth and condition was very good, but survival and relative abundance was lower than expected. Existing stocking rates were deemed appropriate at Shagg Pond (Sumner) and Indian Pond (Woodstock). In addition to stocking rate revisions, the Governor Hill Hatchery has made considerable progress in producing larger size spring yearling splake, which is expected to increase post-stocking survival. These larger spring yearlings became available in 2001. In addition to improved size at stocking, splake were stocked out earlier in May when surface water temperatures are cooler and the incidence of bass predation is likely to be less. These possible sources of mortality could be significantly reduced under these new stocking procedures. All the changes outlined above will continue to be implemented over the next several years and the effectiveness of these changes will be re-evaluated no earlier than 2003.

Sea-Run Brown Trout Program

An old fashioned Maine winter resulted in a delayed opening of the sea-run brown trout fishery along the southern Maine coast. By April 1st, ice in both the Mousam and the Ogunquit River estuaries had broken up and anglers reported good fishing for 18+ inch browns. One lucky angler caught a 6 pounder off Ogunquit beach while fishing for stripers this past summer.

Browns (14–16 inches long) were again stocked in the fall at the Mousam and the Ogunquit Rivers. Two hundred similar-size, unscheduled rainbows were also released, in addition to some 4-pound brook trout, and 3-pound browns. The Mousam River provided good fall fishing for lots of 13 to 17 inch browns, as well as rainbows. One 27- inch brown was also reported. Fair fishing was reported on the Ogunquit River. Slower fishing on the Ogunquit may have been drought-related. Public access problems resulted in the suspension of stockings in the Webhannet River in Wells. The Salmon Falls River (below South Berwick Dam) was experimentally stocked with browns for the first time. However, fishway construction activities at the dam limited stocking truck and angler access, resulting in fewer fish being stocked this year. Early reports on the newly stocked Salmon Falls River were encouraging, and we plan further stockings here next year.

New Electrofishing Boat

After numerous attempts to secure funding for a new electrofishing boat, we were finally successful this past fall, when needed funds were awarded through the Maine Outdoor Heritage Grant Program. The new boat will likely be purchased sometime next spring or summer, and although the boat will be stationed in Gray it will support a wide range of activities statewide. The new boat will be particularly useful for bass management, monitoring illegal introductions, and supporting Warden service enforcement operations.

Live Smelt Transfers

Over the past 4 years, live smelts have been stocked on an experimental basis to create new smelt populations. In the past, the Fishery Division has had good success using smelt eggs, but commercial dealers on the "Smelt Working Group" urged us to revisit the use of live smelt transfers in an experimental program. The goal of this experimental stocking program is to create new smelt populations, which could then serve as donor sources for future live smelt/smelt egg transfers. Live smelt were stocked for 3 years into Ingall's Pond (Foster's Pond) in Bridgton, but subsequent monitoring indicated that few smelt were present. Despite this failure, in the spring of 2001, live smelts were transferred to Bunganut Pond in Lyman for the same purpose. Subsequent introductions are planned for the next 1 to 2 years, followed by monitoring. Additional live smelt transfers are not planned, pending the outcome at Bunganut Pond.

Hydroacoustics Sampling

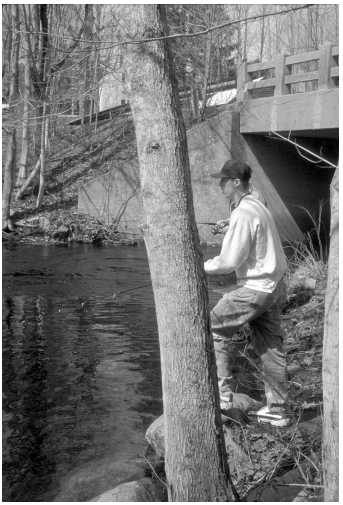
A few years ago, the MDIFW received an Outdoor Heritage Grant to purchase hydroacoustics equipment (a high-tech, ultra-sensitive fish finder) for monitoring smelt populations on important landlocked salmon waters around the State. This new equipment would allow biologists to evaluate smelt numbers and biomass for trend- monitoring on a limited number of lakes

In September, Regional staff conducted hydroacoustic surveys on Sebago and Thompson Lakes for the second successive year. We sampled a total of 23.5 miles on Sebago and 8 miles on Thompson. We have begun the time-consuming process of editing and analyzing the data collected to date, but existing glitches have delayed the analytical process. Our new Research Biologist in Bangor (Tim Obrey) is managing this statewide project, and he expects to have these problems corrected in the next few months and results are expected shortly thereafter.

Environmental Reviews

Region A reviews a considerable volume of permit applications for the Department of Environmental Protection and Land use Regulatory Commission, in addition to a plethora of requests from environmental consultants seeking fishery resource and potential impact information. Region A processed more environmental review requests than any other Fisheries Region, in large part because this Region supports the largest human population, where most of the state's development is occurring. Region A fisheries staff is also responsible for preparing review comments and making recommendations to state and federal agencies involved in the relicensing of hydroelectric projects. There are currently seven hydroelectric projects undergoing various stages of relicensing in Region A. Six projects (Eel Weir, Dundee, Gambo, Little Falls, Mallison, Saccarappa) are located on the Presumpscot River, one other (Bar Mills) is located on the Saco River.

We also participated in the Saco River Coordinating Committee, which is a formal working group comprised of state and federal agencies, Florida Power and Light, and other non-governmental interest groups. The work group shares the responsibility for overseeing the implementation of fish passage and other restorative measures designed to enhance migratory species of fish. The forum also provides an opportunity to address areas of potential conflict resulting between restoration activities and the management of resident fisheries.



Milfoil

The potential spread of invasive aquatic plants continues to lead the headlines and occupies an increasing amount of our time. Variable-leaf milfoil has been identified at several locations in southern Maine, including but not limited to Sebago Lake, Auburn Lake, Thompson Lake, Lake Arrowhead, Balch Pond, Pleasant Lake, and Little Sebago Lake in addition to other small ponds, rivers, and streams.

To date, this variety of milfoil has not threatened any of our fisheries, but has resulted in localized socio-economic conflicts. Eurasian Milfoil, the most invasive species of milfoil has not yet been identified in Maine waters. The following is a short list of ongoing variable-leaf milfoil control projects, which will undoubtedly increase in number each year.

- At Lake Arrowhead in Limerick, lot owners are concerned about the rapid spread of this plant. Beginning next year a study will begin to determine the effectiveness of a lake draw down on controlling milfoil, as well as the impacts on existing fish, invertebrate, plant and animal populations. We are concerned that the use of drawdowns to control plant life will negatively impact fish populations. Hopefully this study will shed some light on the subject.

- At Pleasant Lake and Parker Pond in Casco, the lake associations have raised enough money to erect a milfoil screen to prevent the spread of the plant, and will also pay for engineering studies to develop a more permanent fix, which will be compatible with fish and wildlife species.

- At Little Sebago Lake, divers were hired to eradicate localized populations of this invasive plant.

- At Sebago Lake the Portland Water District has spent a considerable amount of time and money identifying and monitoring the spread of the plant, as well as educating the public as to the importance of preventing the spread.

Noteworthy Fish From the Region

Each year there are many noteworthy fish caught in the Sebago Region. The following is a sample of fish caught during the year 2001.

Angler	Lake	Species	Weight (Lb)
Richard Sherman	Square P.	Brown Trout	15
Warren Gamash	Sebago L.	Lake Trout	15.3
Gerry Ford	Sebago L.	Lake Trout	17.9
Mike Farrell	Sebago L.	Lake Trout	15.7
Scott Gonya	Sebago L.	Lake Trout	16.7
Scott Krouse	Thomas P.	Chain Pickerel	5.2
Christine Saucier	Hancock P.	Largemouth Bass	6.7
Richard Crosby Jr.	Sebago L.	Lake Trout	18.1
Justin Douglas	Collins P.	Chain Pickerel	5.1
David Duguay	Square P.	Brown Trout	10
Kurt Harling	Moose P.	Largemouth Bass	9.1
Robert Hlitser	Sabbathday L.	Brook Trout	5.3
Tim Hummer	Crystal L.	Brook Trout	4.1
Wayne Jordan	Swan P.	Brook Trout	4.1
Eric Kirmes	Sebago L.	Lake Trout	15.1
David Libby	Sebago L.	Lake Trout	17.1
Ed Pomerleau	Worthley P.	Brown Trout	11.2
Michael Sabo	Boyd P.	Largemouth Bass	7.8
Ramona Sleeper	Sebago L.	Lake Trout	15.6
Michael St. Pierre	Crystal L.	Brown Trout	10.5
Richard Strout	Swan P.	Brook Trout	4.9
Rory Trudeau	Square P.	Brown Trout	6.2
Mike Martiner	undisclosed	Splake	4.7
Mike Williams	undisclosed	Largemouth Bass	5.6
Gene Miller	undisclosed	Lake Trout	11.3
Gene Fadrigon	Sebago L.	Lake Trout	13.9
Steve Cotter	Muddy R.	Brown Trout	4.76
Al Tucker	Sebago L.	Lake Trout	12.9

Belgrade Lakes Region (B)

Public access is a high priority in fisheries management in all Regions. The latest four purchases in Region B consist of land, located on the Kennebec River in the towns of Shawmut and Benton. These purchases will ensure that anglers have access to one of central Maine's most popular fisheries. The western side of the river (Shawmut) consists of two separate parcels that are split by the Maine Central Railroad. The larger parcel includes 25 acres with approximately 2,500 feet of river frontage. The other parcel, 7.6 acres, is located between Bray Avenue in Shawmut and the west side of the railroad. The east side of the river (Benton) consists of 12 acres and includes 2,250 feet of river frontage, and is located of the west side of the River Road and south of the Clinton town line. Round and Long Ponds in Livermore will also have access, this land is located between the two ponds along Route 4. The fourth purchase consists of land on Clary Pond in Jefferson and is about 2,000 feet of frontage between the pond and the junction of Routes 215 and 126.

2001 Trapnetting Summary

Trap netting is the most effective sampling method for spawning fish, whether it is salmon and trout in the fall or pike and bass in the spring. The data collected assist fisheries biologists in making regulation changes, estimating fish populations, and determining condition factors and movements of fish.

Great Pond (Rome): Two trap nets where deployed in the fall in three locations for 56 net-days on Great Pond .The total brown trout catch was 73,with an average length of 19.7 in and average weight of 3.4 lbs. Brown trout are carrying over to at least age V+. Condition factors (degree of well being, robustness) remain well above 1.0; this growth rate is most likely the result of the exploding population of landlocked alewives. The stocking rate of ½ brown trout / acre could be a factor in maintaining the good growth rate. Increasing the number of stocked brown trout (to provide a higher catch rate) could be considered but may threaten the current prey / predator balance.

Kimball Pond (Vienna): Two trap nets where set in two locations for a total of 46 net- days in Kimball Pond. This is the fifth year of fall trap netting to evaluate paired stockings of two strains of brook trout (Kennebago/Sourdnahunk). The total brook trout catch was 299. The numbers, size and survival of brook trout to age II+ and older from this year's netting are similar to data collected in previous years. The slight difference between the strains remains consistent with that which has been previously reported (see Progress Report, Bonney, 2000). Beginning in the fall 2001, fall-fingerling Maine Hatchery and Kennebago strain brook trout will be stocked and compared for the next 4 years.

Long Pond (Belgrade): Over the years, the salmon fishery in Long Pond has taken its lumps; this is believed to be partly caused by predation from northern pike on newly stocked spring yearling salmon. Starting in the fall of 2001, in an attempt to lessen this predation, the annual stocking of spring yearling salmon was replaced with a stocking of larger fall yearling salmon. One trap net was set at Great Pond inlet for a total of 14 net- days; no salmon were caught. However, 12 brown trout were caught with an average length of 23.3 in and an average weight of 3.4 lbs. The brown trout caught are fish that have dropped down from Great Pond or migrated upstream from Messalonskee Lake. Another factor that may affect Long Pond's fishery in the future is the impact of the exploding land-locked alewife populations on the fragile smelt population. The walleye population in Long Pond appears to be dwindling. The history of walleye catches include: the first fish caught in 1996, five in1997, a high of 14 in1998, four in 1999, and three in 2000. There were no walleyes caught in 2001, and there were no signs of any reproduction of young fish from any year.

Flying Pond (Vienna): Two trap nets were set in four locations with moderate success. In 42 net-days fished, only seven brown trout were caught. The low number of brown trout is of concern. Whether this low number indicates a lack of carry-over or a high harvest rate is not known. The average length of brown trout was 17.1in with an average weight of 2.4lbs. The impressive size would indicate a favorable forage base for the possibility of increasing the stocking rate. However, more data should be collected before a decision is made.

Upper and Lower Narrows Pond (Winthrop): One trap net was set in each pond and fished a total of 11 net-days for a total catch of 12 salmon, 18 lake trout and 7 brook trout. The average length and weight for salmon was a respectable 22.5in and 4.6lbs. Lake trout average length was 20.6in, while the average weight was 3.2lbs. All of the brook trout caught are believed to be carryover from the spring yearling stocking. Growth for all salmonids in Upper and Lower Narrows Ponds is very good with condition factors above 1.0. Unfortunately, the relatively small size of the ponds dictates the numbers of fish that can be stocked, limiting the number of larger, older age fish in the population.

North Pond (Smithfield) & Great Pond (Rome): Two trap nets where used in the spring of 2001 at North Pond. One trap net was set in Great Pond at the mouth of Great Meadow Stream. The objectives of the trapping operation were to determine movement of northern pike between Great Pond and North Pond, and to estimate harvest by using tag returns from anglers. Northern pike that where caught in either pond were tagged with a specifically numbered tag, and released into the water in which they were trapped. North Pond was netted for a total of 58 trap-net-days with a catch of 99 northern pike; the average length was 37.8in, and average weight was 6.1lbs. The Great Pond net fished a total of 36 trap-net-days with a total catch of 94 northern pike. The average length of pike was 25.6in, and average weight was 5.1lbs. Only one pike was recaptured in Great Pond after being first tagged in North Pond.

Creel Survey 2001

Annual winter sport fishing surveys are conducted to monitor Regional fishing activity and assess fishery management programs. Staff interviews anglers and collects biological data from all sport fish.

Androscoggin Lake (Wayne): This is the third consecutive year Androscoggin Lake has been surveyed on both weekends and weekdays. Angler effort remained consistent compared with previous years; the 2001 winter angler estimated use was 27% lower than in 2000. The past three winter surveys were completed to assess the effects of reducing the annual brown trout stocking rate from1 fish/acre to ½ fish/acre, which began in 1998. Historically, winter catch rates for brown trout have fluctuated at Androscoggin Lake. Recently, a steadily declining trend has been observed in the catch rate. The catch of legal brown trout/angler dropped dramatically in 2001.The primary cause for this declining trend is the low number of age II brown trout in the catch. The winter survey of 1997, under the influence of the higher stocking rate, revealed that 55% of the catch was comprised of age II brown trout. Surveys for the past three seasons indicate age II brown trout contributed only 5% to the total catch. Further analyses of all data will be necessary to evaluate the effects of the lower stocking rate.

Great Pond (Rome): Angler use on Great Pond dropped 23% from the previous winter (2000). Factors affecting the angler use on Great Pond include poor ice conditions and the below-average catch rates for nearly all species. Catch rates for both brown trout and northern pike were down dramatically, as was the average size of those species. Many anglers thought the reason for the slow fishing was due to the growing landlocked alewife population. The fall trap net data for 2000 supported this observation.

Messalonskee Lake (Oakland): The greatest decrease in angler effort was on Messalonskee Lake. Catch rates dropped 35% from 2000. Splake checked at Messalonskee Lake represented at least three age classes in the winter harvest. Growth also continues to be good, with a slight improvement in the condition factor in the 2001 season. The disappointing aspect of the survey was that the percentage of anglers catching a legal splake dropped from 12% to just 6% in 2001. The purpose of the splake program was to provide a higher catch rate than the previous brown trout program.

Parker Pond (Mt Vernon): Parker Pond remained consistent in angler effort compared to the 2000 winter survey. Annual stocking of landlocked salmon was suspended in Parker Pond in 1999, due to poor salmon growth, caused by low numbers of rainbow smelt. This cessation of stocking is an attempt to relieve salmon predation on the smelt population and allow the population to recover naturally. Smelt egg transfers were initiated in 1998, and since that time a total of 10 different transfers have taken place. The suspension in the salmon stocking apparently was successful, and within 2 years the salmon growth improved. Poor

growth due to the low smelt populations may have a more lasting effect on a salmon's length than on its weight. In the spring of 2001, the salmon stocking was reinstated (at a reduced rate) and will be monitored in 2002.

To maintain a cold-water fishery in Parker Pond, when salmon stocking was suspended, brook trout were stocked in 1999.Although the total number of brook trout sampled was low, trout comprised 25% of the 2000 winter catch and climbed to 49% of the 2001 winter catch. Also encouraging was the catch of age III brook trout that were stocked in 1999 and contributed to the 2001 winter fishery.

Wassookeag Lake (Dexter): Wassookeag Lake, also surveyed for the second year, showed a decrease in angler effort from 1.66 in 2000 to 1.32 angler/acre in 2001. A restrictive regulation on the wild lake trout population was adopted in 1993 (20 inches, one fish), because fish were not reaching sexual maturity with the 18 inch length limit. During this winter's survey, 66% of the lake trout caught were sub-legal with the majority (58%) of those reported to be between 18 and 20 inches. The lake trout (togue) catch rate more than doubled compared to catch rats in the early 90's. This increasing trend in the catch of both sub-legal and legal lake trout is an indication of a growing population, which was the objective for increasing the minimum length limit on lake trout. The low condition factor of landlocked salmon (0.86) has raised concern and can be attributed to the low smelt population, which was first noted during the smelt run survey in 1999. The large lake trout population is probably a contributing factor to the low smelt population. Smelt egg transfers were initiated in 2000 and continued in 2001 to bolster the smelt population.

Grand Lakes Region (C)

New Headquarters Occupied

The first week in September marked the opening of our new Downeast Regional Headquarters located in Jonesboro. This new headquarters is much larger than the old four room office building in Machias, and houses three inland fisheries biologists, three wildlife biologists, their seasonal assistants, and equipment, as well as three Atlantic Salmon biologists and their five seasonal assistants. This building allows biological staff more room to better organize equipment, data, and personnel, thereby improving efficiency in serving the public, as well as managing the natural resources of eastern Maine.

Phone numbers are: Fisheries Biologists (207) 434-5925,
Wildlife Biologists (207) 434-5927, and
Atlantic Salmon Commission (207) 434-5920.

West Grand Lake

Regional Biologists conducted their annual spring sport fishery survey from early May through mid-June and it revealed good fishing at West Grand Lake. Both the salmon catch rates and togue catch rate exceeded their long-term averages. One disappointment was the relatively small size (1 lb., 9 oz) of creeled salmon. The fact that anglers kept more of the younger 14 -15- inch fish than usual contributed to the overall reduction in size quality. Nonetheless, salmon weighing greater than 2 lbs still comprised 31% of our sample. Togue averaged 3 lb, 2 oz in weight, which was very typical for the past 3 years.

A fall trap-netting sample of 100 salmon was obtained in October and showed that 33% of the salmon had been hooked. This represents an increase from the usual 20 to 25% hooking injury incidence usually observed. This indicates that anglers came in contact with more salmon which correlates with our survey showing higher catch rates. Of the 100 fish sampled, 60% were age 2+ and averaged 16.8 inches in length and 1lb, 8 oz in weight. Thirty percent were age 3+ and averaged 18.7 inches in length and 2 lbs, 3 oz in weight. Age 4+ and 5+ year old salmon comprised almost 9 % of the sample with wild salmon accounting for 1%. Most salmon were in very good shape.

Tunk Lake

Winter anglers enjoyed another productive season, catching togue at about twice as fast as the state-wide avera. Biologists estimate that anglers harvested about 170 togue which averaged a little over 3 lbs. An effort was made to convince anglers that it was beneficial to keep more of their togue to help “thin out” an overly abundant population, thereby helping to create improved growth conditions for salmon and togue. This is a “tough sell” on Tunk, where most anglers practice catch and release to a high degree, believing that some of the 3-4 lb togue they release will someday grow to be 7–10 pounders. The effort to influence angler behavior may have been partially successful, as the proportion of legal togue

caught which were harvested increased to 47% from 41% in the winter of 2000. If anglers can be persuaded to keep more of the togue they catch in the next few years, it should help to prolong the upswing in salmon growth.

Fall trap netting results confirmed a solid rebound in the salmon growth rate. Age 3+ fish averaged 3 lb, 5 oz in weight, the best since 1990. Salmon measuring greater than 20 inches accounted for 58% of our catch; the largest was an age 5+ hatchery-reared fish, which weighed 5 lb, 6 oz. For the second consecutive year, wild salmon were well represented in our sample, comprising 39% of the catch. These results suggest that in 2002 certain Tunk Lake anglers will leave the lake with smiles of satisfaction.

Alligator Lake

The winter season at Alligator Lake was one of the best on record for wild brook trout. Most brook trout observed by biologists were age 4 and averaged just under 14 inches. It was a slower winter season for salmon, with anglers catching some 3-4 pounds.

Anglers enjoyed some fine sport during the open water season. We monitored relative fishing quality during this season through voluntary records kept by anglers who frequently fish the lake. For the 5 years from 1996 – 2000, the catch rate for salmon greater than fluctuated greatly. This year, the catch rate improved to nearly twice that of the previous high! Most of these fish measured between 20-22 inches, although several beauties in the 4 - 5 lb range were caught. One party of two really hit the jackpot on Sept. 14; they fished a long day, from 6:30 am until 5:00 pm, but it was well worth it as they landed three fish between 23-25 inches!

For 2001, vagaries in climate proved to be challenging for biologists trying to trap-net salmon, as warm water temperatures and low flows resulting from one of the driest and warmest years on record, hampered a 3-week netting effort which culminated in a catch of only 21 salmon, compared to the normal catch of 60 to 80. Of the 21 salmon sampled, 24% were wild size 3+ to 5+, 14% were stocked age1, 5% were stocked age 2+, 24% were stocked age 3+, averaging 21.1 inches and 3 lbs 5 oz. Thirty-three percent of the catch were stocked age 4+, which averaged 20.3 inches and 2 lbs 12 oz. Three brook trout measuring 12 to 16 ¼ inches were also captured. All salmon and trout observed were fat and healthy.

Summer electro-fishing studies showed very few young salmon in the outlet, Alligator Stream. This was anticipated following the low water conditions in the outlet cove in the fall of 2000. Most salmon spawning takes place there, and the resulting fry migrate into protective nursery habitat in the outlet where they spend the next 1 to 2 years before migrating back up into the lake. The end result of the low water levels will be fewer wild salmon in the lake fishery.

E. Monroe Pond
In October, biologists trap-netted a sample of 72 brook trout at East Monroe Pond in Township 43 MD, as part of an on going study to evaluate Nesournahunk and Kennebago wild brook trout strains experimentally stocked since 1996. Our results showed that by the time the trout reached 1+years of age, the Kennebago strain comprised 67% of our sample, thereby demonstrating better survival. Kennebago strain averaged 9.3 inches in length while Nesournahunks averaged 9.1 inches. In addition to these fish, we captured, six 3+ year olds, averaging 14 inches. The largest trout captured was a 16-inch Nesournahunk female. A mark and recapture population estimate indicated a population of 86 trout. This pond is closed to fishing in odd numbered years, and when it opens next spring, anglers should enjoy some fine trout fishing.

Hydro-acoustic Sampling
Using the Fisheries Division's scientific-quality sonar equipment, staff conducted hydro-acoustic surveys for the second consecutive year to assess abundance of rainbow smelts at West Grand, Tunk, Cathance, and Big Lakes. Navigating entirely by GPS (global positioning system), multiple transects throughout the lake were sampled at night when smelt ascend from the bottom and suspend as individuals throughout the water column. Some lakes could be adequately sampled in one night, while larger lakes required two nights. Data analysis will be done during the winter of 2002. Eventually, it's anticipated that salmon stocking rates may be quickly adjusted to more closely track fluctuations in smelt abundance.

Bass Sampling
Random samples of smallmouth bass were obtained during May and June in six waters: Woodland Flowage, Grand Falls Flowage, Big Lake, West Grand Lake, Wabassus Lake, and Clifford Lake. The information obtained will help biologists assess population abundance, monitor age and growth, and evaluate regulations, on these important bass populations.

Staff deployed 10 water temperature data loggers to record hourly water temperatures in the shallow littoral zones of West Grand Lake, Big Lake, Grand Falls Flowage, Woodland Flowage, Pocomoonshine Lake, Meddybemps Lake, Cathance Lake, Green Lake, Branch Lake, and Beech Hill Pond. These data were examined for correlation of young-of-the-year smallmouth bass growth during their first summer. Samples of young-of-the-year smallmouth bass were then obtained in the fall by electro-fishing along the shores of the 10 lakes. Average length of first year smallmouths generally ranged from 2.1-2.5 inches by late October. Hot summer temperatures did not necessarily produce large first year bass. When bass fry are quite abundant along the shoreline, they can exert enough competition for food to result in slow growth even though they are only 3-4 months old!

First Differential Largemouth Bass Regulations
In the fall, the Department's Advisory Council passed the first ever regulations that set differential harvest restrictions between largemouth and smallmouth bass. In the past, all bass in Maine waters were referred to as "black bass", and were never separated by species. With the new largemouth bass regulations promulgated for Pocomoonshine, Upper & Lower Mud, and Crawford Lakes that is beginning to change. The new regulations were suggested by local angler Dave Kelso and modified by Regional Biologists. They became effective on January 1st and read as follows: All largemouth bass between 14 and 20 inches must be released alive at once. The daily bag limit on largemouth bass is one fish either between 10 and 14 inches or one over 20 inches. The new slot limit regulation is designed to protect larger bass for spawning and recruitment purposes as well as to increase the number of trophy-size bass.

Public Access
Downeast anglers will enjoy better access and parking in the future at a number of Hancock and Washington County waters. This past summer the Department purchased acreage along side Bog Lake in Northfield and Jacob Buck Pond in Bucksport. Until recently, Bog Lake had been stocked with brown trout and landlocked salmon, creating good fishing for its anglers. Once public access across private land was stopped, the stocking program was terminated. The new launch site will be located off Route 192 and will accommodate 8 to 10 vehicles with trailers. It is scheduled for completion next fall. Stocking will resume once it is built.

At Jacob Buck Pond in Bucksport, problems at the small shallow public access on private land have been resolved because the Department purchased a 2-acre parcel with deep-water frontage making for easy back in boat access and parking. The area will accommodate six to eight vehicles and trailers. We stock splake here and this species has provided a popular fishery, with some fish caught up to 3 pounds.

For the first time in 12 years, Craig Pond in Orland was stocked with landlocked salmon and brook trout after the gate was re-opened for the months of June, July, and August. Region C Biologists and Department administrative staff successfully negotiated a one- year trial reopening with the US Fish & Wildlife Service through a "Memorandum of Understanding" that allowed public access for the summer of 2001. This agreement was signed by the USFWS, IF&W, Maine State Police, and the Hancock County Sheriff's Department, in a cooperative effort to provide public access, fish stocking, fishing, and keeping the beach clean and safe. This first summer was very successful with only minor problems. In the fall, the Department improved the boat launching site by installing 75 feet of concrete ramping. Next

summer, the gate will again be opened for another seasonal trial period. Plans are under way for a cooperative construction project between the USF&W & IFW to build a new 25 vehicle parking area near the site, which will alleviate parking congestion. The project should be completed by June.

Branch Lake anglers were delivered a heavy blow when efforts by IF&W to construct a public boat launching site on state property to replace the closed Hansen's Landing access failed, due to opposition from the town and camp owners. Subsequently, the Department terminated the landlocked salmon stocking program due to inadequate public access and won't resume salmon stocking until a replacement access is built. We've had a successful salmon stocking program at Branch Lake since 1939, making it one of eastern Maine's premier fisheries. We anticipate that most salmon from past stockings will disappear from the lake by 2003, and wild salmon produced in the tributaries primarily from stocked fish parents will disappear shortly thereafter. This is the sad scenario that anglers must endure until the access impasse is resolved.

Elsewhere in the Region, the Department has constructed an additional parking area at Little Falls adjacent to Grand Lake Stream in Township 27 ED. This parking area is a Cul-De-Sac design and will accommodate 10 vehicles while melding well with the natural landscape. Grand Lake Stream is the outlet of West Grand Lake and an inlet to Big Lake. Both waters have landlocked salmon that migrate into the stream in the spring and fall making this 2-mile stretch of water one of the top five landlocked salmon stream fisheries in the state.
Down the road at Big Lake in Township 27 ED, plans are underway to improve parking and launching at the Greenlaw Chopping Landing. The Department hopes that in the near future vehicle parking will be expanded and concrete ramping put in place to improve this important access point.

At West Musquash Lake in Talmadge, the Department in cooperation with Domtar, substantially improved the boat access site by removing protruding rocks in and out of the lake. These troublesome boulders and sharp pieces of ledge were replaced by a smooth layer of small screened rocks and gravel making it easier for boats to be launched. The project will cost $1,800.00, and Domtar graciously picked up the tab. Anglers seeking ice-out action next May at this quality wild salmon and togue water will be pleased with the new "hassle-free" launch site.

Rangeley Lakes Region (D)

The Rangeley Lakes Region encompasses an area of 4,232 square miles in western Maine and includes 347 Great Ponds with a total surface area of 109,730 acres. It also includes over 4,800 miles of rivers and streams in the Androscoggin River and Kennebec River drainages.

In 2001, almost 190,000 brook trout were stocked into 97 lakes and ponds (51,085 acres) and eight rivers and streams (210 miles) to provide or supplement fisheries. Also, 12,600 landlocked salmon were stocked into 14 waters (39,050 acres and 90 miles), and 17,950 brown trout were stocked into 10 waters (1,777 acres and 215 miles). A total of 26,400 splake were stocked into six waters (4,160 acres), and 2,750 rainbow trout were stocked into three rivers (110 miles). Lake trout (primarily retired brood fish) were stocked into five waters (5,687 acres). Stocking methods included airplane, truck, boat, and backpack.

Winter sport fishery surveys were conducted on three of the Region's lakes during the winter of 2001: Smith Pond (Brighton Plt.), Webb Lake (Weld), and Wyman Lake (Moscow). We interviewed 780 anglers over the 3-month season. Catch rates for most fish species were above average on Webb and Wyman Lakes. Angler use on Wyman Lake, where splake were introduced in 1996, was much higher than during a survey conducted in 1987, indicating a strong interest in this species by winter anglers. Angler use on Webb Lake was below average, and brown trout growth and condition were below our objectives. Slow growth rates are attributed to severe competition from several species of warmwater fish and marginal water quality in the lake.

In the spring, we transferred smelt eggs to Pleasant Pond (Caratunk) and Webb Lake (Weld) to augment forage for various salmonids. Hydroacoustic surveys were done on Embden Pond and Rangeley Lake during the summer to measure smelt abundance.

New public access sites were acquired on the Sandy River in Farmington Falls and New Sharon as part of a continuing effort to provide legal access to all public waters in the Region. In addition, potential access sites on Oaks Pond (Canaan) and Hancock Pond (Embden) were evaluated.

A systematic survey of the Region's bass populations continued in 2001 at Norcross and Sand Ponds (Chesterville) and Pease Pond (Wilton). Samples were obtained using the Division's boat electrofisher. Three additional bass ponds are scheduled to be sampled during the summer of 2002. In the fall, young smallmouth bass were sampled from Ellis Pond (Roxbury) as part of a statewide study designed to assess summer temperature effects on first-year bass growth and over-winter survival.

We continued our stream survey program by surveying the 7-mile-long South Bog Stream, a tributary to Rangeley Lake. This survey was accomplished in 3 days with the assistance of 13 volunteers and several Department personnel. We walked and boated the entire stream, stopping frequently to take measurements of brook trout habitat. Separate crews determined population age structure and abundance.

Fish population and water quality evaluations were conducted on 18 Regional waters. Six of these ponds had not been previously surveyed. The age and growth information that we collected permits us to determine appropriate stocking rates and fishing regulations.

Regional biologists assisted the Department's engineering staff in reconstructing a barrier dam on the outlet of B Pond in Upton. This small dam was originally built in the late 1950's to prevent the upstream migration of yellow perch from Umbagog Lake. Additional threats from Umbagog to B Pond, which supports outstanding populations of salmon and brook trout, include smallmouth bass, largemouth bass, and northern pike.

Throughout the year, 67 volunteers reported information on their fishing trips from 61 lakes and ponds and 26 rivers, streams, and brooks. They reported when, where, and how long they fished as well as the number and lengths of the fish they caught. Voluntary data were also collected with creel survey boxes set up along the upper Androscoggin River and at Spring Lake (T3 R4 BKP WKR).

We trapnetted six Regional waters in the fall of 2001. On September 29, nets were set into Round Pond in Chase Stream Township. The goal was to conduct a population estimate and evaluate the 18-inch minimum length limit regulation on brook trout. The nets were fished 13 days catching a total of 223 trout. The trout ranged in size from 3½ to 16½ inches in length. A population of 425 brook trout was estimated in the pond. The study indicated good size and numbers of brook trout in this wild trout pond.

At the same time trapnets were set into nearby Horseshoe Pond to acquire general population information of a wild brook trout pond. In 13 days of netting 348 trout were caught. They ranged from 4½ to 15 inches. A population estimate of 1,645 brook trout was calculated for the pond. Again this survey showed a healthy population of wild brook trout.

A trapnet was set at Dodge Pond in Rangeley to learn more about this wild salmon population. The net was fished 29 days and took 113 salmon and 48 brook trout. All of the salmon were wild. They ranged from 4½ to 23½ inches and the largest weighed 4 pounds. The brook trout ranged from 7½ to 17½ inches; 44% of the trout were native to the drainage.

Upper Richardson Lake was also trapnetted, near where Upper Dam Pool empties into the lake, to evaluate salmon growth. The net was fished for 24 days and caught 81 salmon, 10 brook trout, and 5 lake trout. The largest salmon was a 24-inch, 4 pound 14 ounce, 5 year-old male of hatchery origin. About 60% of the salmon catch was composed of hatchery-reared fish. The largest brook trout was 18 inches and 2 pounds 6 ounces. The largest lake trout was a 28½-inch, 8 pounds 11 ounces, 7 year-old female of hatchery origin. All the lake trout were stocked.

Trapnets set into Rangeley Lake near the outlet were fished for 26 days to evaluate the salmon growth. A total of 172 salmon and 4 brook trout were caught. About 23% of the salmon handled were of wild origin; 22% of the hatchery-reared salmon were aged 4 years + old or greater. The largest salmon were a 25½-inch 6 pound 5 year-old male and a 25-inch 6 pound 4 ounce 6 year-old female. Nearly 40% of the salmon we examined had scars from being previously hooked and released by anglers. The largest of the four brook trout caught was 15½ inches and weighed 1 pound, 8 ounces.

McIntire Pond in New Sharon was also trapnetted for the final comparison of the two wild strains of hatchery brook trout. In 21 days of netting we caught 156 trout. The largest was a 15½-inch, 1 pound, 8 ounce, 3 year-old male fish; 77% of the trout were of hatchery origin. A total population of 503 brook trout was estimated in the pond.

The spawning run of salmon from Mooselookmeguntic Lake was sampled in the Kennebago River to begin assessing a regulation change made in 2000, which is intended to shift harvest to the younger salmon and provide additional protection to the older fish. A total of 81 salmon was captured using a large seine. The largest salmon were two 8 year-old females, one 23-inch, 3 pound, nine ounces and another 22-inch, 4 pound, 1 ounce. Over 60% of the fish were 6 years old or greater. Further sampling will be conducted to determine if the high percentage of older age salmon is a response to the new regulation or if it is more related to anglers' increasing propensity to release legal-size salmon voluntarily .

An ongoing survey to locate lake trout spawning areas in the Region continued in the fall of 2001. Likely spawning habitat in Jim Pond (Jim Pond Township) was inspected for lake trout eggs using SCUBA equipment.

Office work is necessary to analyze all the information that has been collected. Scales are aged, stomachs contents are examined, and fish lengths and weights are summarized. After the data have been interpreted the results are published in a variety of formats, or summaries are filed for future use.

Moosehead Lake Region (E)

The Moosehead Lake Region encompasses 4,525 square miles along the Canadian border in west central Maine. It includes approximately 4,200 miles of rivers and streams that comprise the headwaters of the Kennebec, Penobscot, and St. John Rivers. It includes 625 lakes and ponds 10 acres or larger in area, and another 655 ponds less than 10 acres in area. Nearly a quarter of the surface area of all Maine's lakes and ponds is found in the Moosehead Region. The majority of these waters remain relatively undeveloped and unaltered, either physically or biologically, by human influence. Consequently, although the year-round resident population in the Region is lowest among Maine's seven Fishery Management Regions, this Region is a destination of choice for both residents and nonresidents for their weekends, holidays, and vacations.

Three fishery biologists plan, implement, and evaluate the management programs for all of the Region's waters. During 2001, they recruited five temporary workers on a seasonal basis to assist in the fieldwork required to complete the Regional work schedule. As in past years, assessing the Region's fisheries, including angler surveys, aquatic habitat surveys, and fish population surveys comprised most of the work effort during 2001.

The ultimate product of our fishery management efforts is the variety of fishing opportunities available to anglers, and the quality of fishing they experience. Therefore, we consider the anglers our best source of information about the Region's fisheries. In our clerk sport fishery surveys we actively seek out and interview anglers to collect essential information on the use, catch, and harvest in the Region's waters. Because they are labor intensive, we can survey only a limited number of waters in any one season. In 2001, we conducted clerk ice fishing surveys on three waters: Hebron Lake, Sebec Lake, and Moosehead Lake. During the open water season, we conducted a clerk survey on Moosehead Lake. Information on 2,049 days of ice fishing, and 2,093 days of open water fishing was recorded in these surveys.

Moosehead Lake comprises roughly one-third of the area of all of the Region's lakes and ponds, and it is one of the State's most important recreational fisheries. It generates much of the public interest in the Region, and therefore receives a great deal of our attention. Our clerk surveys during 2001 found that annual use at Maine's largest lake has stabilized to about 38,000 days of fishing, a level that we believe is sustainable. Fishing for lake trout remains very good, in fact, some of the best lake trout fishing in Maine can be found at Moosehead Lake – both winter and summer. However, due to the abundance of lake trout, increasing salmon abundance by stocking more salmon is not possible at this time. With the existing competition for forage, principally smelts, between salmon and lake trout, salmon growth remains acceptable, but below objectives for the average size of the fish anglers would like to see in their catch. The new bag limit of five lake trout

implemented for 2002 will allow anglers to harvest more lake trout, which should benefit salmon in the future. Moosehead Lake's brook trout continue to provide a respectable fishery, with some very nice trout appearing in the 2001 harvest.

In a Region with so many waters, it is apparent that if we had to rely only on the information we can collect in our clerk surveys, we would not know very much at all about the fishing throughout our Region. Therefore, we encourage volunteers to keep records of their fishing in books we provide to individuals, on cards provided in boxes located at principal access points to many Regional waters, and in logs maintained at sporting camps. Information from our volunteers helps us to evaluate the status of fish populations, the success of stocking programs, and the effectiveness of fishing regulations.

In 2001, anglers who kept record booklets for us reported results from 454 days of ice fishing on 27 regional waters. During the open water season our record-keepers reported results from 2,321 days of fishing on 86 lakes and ponds plus 18 rivers and streams. In our voluntary box surveys anglers reported 2,169 days of fishing on 18 lakes and ponds and four rivers. At this time, we are still summarizing the voluntary records from sporting camps, which will provide additional information from several hundred days of fishing on more than a dozen waters.

Voluntary records include information on the locations, dates, and times involved in fishing, the number of anglers each outing, and the total catch of fish – both kept or released. On some waters, volunteers have provided daily counts of anglers on "their" ponds, which, when there are enough observations, allows us to estimate total use for a season. Most of our volunteers now provide listings of individual sizes for all fish caught, information essential to evaluating the size structure and growth potential of populations.

For example, using voluntary information from 2001 we have been able to determine the size distribution of some of the Region's splake and brook trout populations. In 11 splake fisheries where winter and summer anglers reported lengths for 198 splake, they caught, 69% of the splake were 12 inches or longer, 42% were 16 inches or longer, and 24% were 18 inches or longer. In 59 brook trout fisheries where winter and summer anglers reported lengths for 1,732 brook trout, they caught, 32% of the trout were 12 inches or longer, 6% were 16 inches or longer, and only 1% were 18 inches or longer. It is quite apparent to us that in habitat where it is appropriate to use them, splake are providing better fishing for larger fish than most of our traditional brook trout fisheries. In this day, when it appears that size really does matter, at least to some anglers, splake offer the potential for high quality fishing opportunities!

On many waters, volunteers have provided information for a number of years, allowing us to assess trends in fisheries, determine the effectiveness of regulations, the need for regulation changes, the results of stocking, and the need for

stocking changes. In the Region, we have voluntary information from 98 trout waters less than 200 acres, and on 44 of these we have information for 5 or more consecutive years. For 12 of the larger Regional waters, with fisheries for more species than just brook trout, we have 10 or more consecutive years of information from 12 waters. There is absolutely no way we could have obtained this information without the help of volunteers!

We appreciate and value very highly the voluntary contributions from anglers who fish in the Moosehead Region. Of all the opportunities to volunteer for the Fish and Wildlife Department, providing fishing information is the most valuable contribution anglers can make to the Fishery Division!

In the North Country, there are usually only 6 months of open water available for surveying fish populations and aquatic habitat. From May through August 2001, we netted 28 waters to determine the relative abundance, the age and growth characteristics, and the food habits of splake, lake trout, and brook trout. These surveys included 18 waters stocked with brook trout, where we evaluated stocking rates for the new wild trout strains, and the effectiveness of fishing regulations at allowing survival to older ages and larger sizes. We have found that although fishing regulations have been effective on waters stocked with the new wild strains, these strains appear to be much more abundant, but growing more slowly, than the old Maine Hatchery strain when stocked in the same waters. New studies are planned to test the wild and domestic strains of trout stocked concurrently in the same water. Until those results are known, we will lower our stocking rates to allow the wild strains to grow better. We want to ensure the best survival and growth possible for all of the trout we stock. This will produce the best fishing possible for the anglers who fish in our stocked trout ponds.

From June 15 through July 30, we trapped the fishway in Moosehead Lake's East Outlet dam to monitor the movement of salmon upstream into Moosehead Lake. In 45 days, 1,919 young, wild salmon passed upstream from the East Outlet into Moosehead, a three-fold increase over the highest number observed in recent years. The Kennebec Water Power Company's 1998 spawning habitat improvement work has certainly been very successful in enhancing wild salmon production in the East Outlet. Our checks of the trap were a very popular attraction for both anglers and visitors on the East Outlet dam. They provided us with an excellent opportunity to demonstrate to the public both fishery management in action and the positive accomplishments of that management. We especially appreciate all of the assistance that Mike Moon, KWP Co.'s attendant at the dam, provided us in tending the Fishway. He installed a water pump, constructed tables for our work, and faithfully recorded data each time we tended the trap. His contributions not only made our work easier and more enjoyable, they greatly improved the conditions for handling large numbers of salmon and releasing them alive with a minimum of stress.

During late July and August, we surveyed nine ponds and two streams to determine their physical, chemical, and biological characteristics, and their potential for management. Our fishery management recommendations are based on findings in these surveys. Most of the largest and most accessible waters in the region have already been surveyed. Thus our recent efforts to inventory new waters have focused on smaller, more remote ponds that are commonly found at the headwaters of drainages. We found that many of these waters do not support any fish. Some are too shallow or do not have the water quality to support fish on a year-round basis. Those with no management potential will be left for the contribution they make to biodiversity as habitat for the Region's non-game wildlife species. Others, however, have the depth and water quality to offer potential for brook trout management. In the absence of competition from other species, trout will grow large, if they are stocked at appropriate rates. For those ponds with no spawning habitat, the trout populations can be maintained through periodic stocking. In these waters lie some of the greatest potential to create more trophy trout fishing in Maine.

In the fall of 2001, as water temperatures cooled and became more conducive to fish movement along the shore, we trapnetted five wild brook trout waters to estimate trout abundance and size class structure, to determine the age and growth of these wild trout, and to evaluate the effectiveness of existing regulations at conserving them. Thanks to grants awarded by the Maine Outdoor Heritage Fund, this year's fall trapnetting included an extensive study of the brook trout in Chamberlain Lake in addition to the last of 3 years of trapping at Trout and Little Moxie Ponds. As October came to a close, we completed our field season by trapnetting Moosehead Lake and First Roach Pond to evaluate the growth and condition of stocked salmon; Kingsbury Pond to evaluate the growth and condition of salmon and splake; and Piper Pond to evaluate the splake program there.

Although the Moosehead Region is best noted for its wild fisheries, in 2001, more than 175,000 salmonids were stocked in Regional waters where habitat conditions limit or preclude natural reproduction. Seventy-five percent of the fish we stocked were either fall fingerlings or spring yearlings that we expect to grow to legal size after stocking, and therefore contribute to fishing in the coming years. The remaining 25%, all of them brook trout, were stocked as legal-size fish and were intended to provide "instant fishing". Many of these "catchables" were stocked in waters where conditions may not be suitable for year-round survival, but where anglers can harvest the majority of them before summer conditions reduce the chances of these fish surviving.

In recent years, we have made a special effort to create more fishing opportunity in the populated areas of the Region. In 2001, most of our 40,000-plus "catchable" trout were stocked in waters that lie along the Route 15 corridor, which threads through the southern part of the region from Dover-Foxcroft, though

Guilford, Monson, Greenville, Rockwood, and on to end up in Jackman. At the Piscataquis River, between Guilford and East Dover, where at eight of our ten stocking sites are not accessible to the immediate shore with the hatchery truck, volunteers from the Piscataquis River Chapter of Trout Unlimited were instrumental in hauling trout from the trucks to the river. Their bucket brigades are now a famous spring sight for travelers along the Piscataquis. A hearty **Thank You** To the Piscataquis River Chapter! We could not have done it without you!

Many of our stockings of catchable trout provide special opportunities for families and the youngsters in the Region. One of our stocking sites where the trout are intended especially for children is a small pond on Dunham Brook in Dover-Foxcroft. In 2001, warm water in this shallow pond precluded stocking there. But through the cooperative efforts of Regional Fishery Biologists, Dover-Foxcroft's Town Manager, and the Dover Kiwanis Club this little pond was enlarged and deepened. IF&W personnel obtained the required permit, the Dover Kiwanis Club paid for the excavation work, and Dover-Foxcroft's town crew hauled away the excavated materials. In future years Kiwanis Park Pond will be an excellent site for multiple stockings of catchable brook trout that the youngsters in Dover-Foxcroft can enjoy on spring afternoons after school.

In 2001, Moosehead Region biologists routinely communicated with anglers and camp owners, and attended meetings in response to public inquiries and concerns. We utilized all of the media available to address the public's need for information concerning fisheries management programs and findings in the Region. We consulted and exchanged scientific and technical information with professionals in other State and Federal agencies and private conservation organizations, with dam owners and operators, and with foresters and other representatives of the Region's landowners and land managers.

Managing fishery resources in a Region with so many waters that offer so much opportunity requires communication, teamwork and partnerships by everyone concerned over the future of our fisheries. Throughout 2001, we consistently developed and fostered teamwork and partnerships with all those who share our goal of making Moosehead Region waters the best in Maine to fish. And this was not a special effort. Communication was an integral part of our daily routine for all of the projects and jobs on which we worked throughout the year.

We end 2001 with a note of thanks to and for all of the anglers out there that we consider our friends as well as our customers.

Penobscot Region (F)

The Penobscot Region encompasses an area of 5,044 sq. miles in north central Maine and includes 368 Great Ponds with a total surface area of 196,020 acres. It also includes over 4,953 miles of rivers and streams in the Penobscot River and St. Croix drainages.

There are 235 self-sustaining populations of salmonids within the Region's lakes and ponds. The majority of these are brook trout waters, mostly located in Baxter State Park and in the hilly terrain of eastern Piscataquis County. Brook trout are present in 196 waters (40,176 acres), and 57,839 trout were stocked in 53 waters (32,900 acres). Salmon are found in 55 waters totaling 131,609 acres of which 21 waters (103,341 acres) were stocked with 32,869 salmon. There are 20 waters with lake trout (81,000 acres) and three of these (32,000 acres) were stocked with 8,160 lake trout. These lakes are being stocked in alternate years, and total number of fish stocked in these three lakes over the 2-year period is 16,500 fish. The purpose of the low stocking rates for lake trout is to develop a fishery for fewer-but- larger fish. Our three splake waters consist of 6,732 acres; they were stocked with 10,839 splake.Nicatous Lake, is our only brown trout water (5,165 acres) and is stocked with 2,400 brown trout.

Smallmouth bass are not stocked and the populations are managed through regulations to provide a fishery that is consistent with the productive capacity of each body of water. There is an active program to evaluate bass populations and habitat. Study waters include the Penobscot River, South Branch Lake, Nicatous Lake, Pleasant Pond in Island Falls, Hot Brook Lakes, and Grand Lake Seboeis. Monitoring of the recovery of the smallmouth bass population in Spednic Lake is continuing on an annual basis. Results have shown a slow but steady recovery of the bass population.

Other bass studies include Electrofishing to capture young-of-the-year bass to determine the average size after the first season of growth. This information is used to predict the rate of survival of this age group during the first winter. We also have temperature units deployed in several bass waters monitoring the temperature changes in the lakes through the open water months.

Illegal introductions of bass continue to occur in the Region. The most recent introductions have occurred in Upper Cold Stream and Cold Stream Ponds. Introductions jeopardize coldwater fisheries and make it difficult, if not impossible, to continue brook trout management in affected waters.

Largemouth bass and landlocked alewife are recent illegal introduction in the Penobscot Region. Largemouth bass were first found in Stump Pond in the Cambolasse Stream drainage in Lincoln and have recently been found in Cambolasse and Long Ponds. They have not yet been found in the Penobscot River but will eventually spread and take up residence there.

Landlocked alewife were illegally introduced into East Grand in the early 1990's and have spread downstream into Spednic lake and into Region C lakes. The smelt population in East Grand has declined so much that the lake and tributaries have been closed to the taking of smelt by dipnet.

Endless lake is the most recent splake water in the Region. This new introduction took place in the fall of 2000, to bring our splake lake total to three waters. Seboeis Lake and Lower Togue Pond continue to produce good action for anglers. Cedar lake is scheduled to be stocked with spring yearling splake in 2002. There are a few other waters in the Region that may be included in the splake stocking program.

Little Round Pond (Lincoln) was reclaimed in 1999 and stocked with brook trout the following spring. Due to the marsh-type shoreline we did not get a complete kill. However, the rough fish numbers were lowered significantly. The ongoing brook trout stocking program continues to produce some very good fishing. We are hopeful that the predation by the brook trout will keep the rough fish numbers in check.

Regional personnel spent the months of January, February and March of 2001, conducting sport fishery surveys on several waters that are open to ice fishing . These included the Pemadumcook Chain of Lakes, West Lake, Nicatous Lake, and Pleasant Lake (Island falls). Anglers were counted and interviewed to obtain catch information. Fish were measured and weighed. Data collected are used to assist in evaluating regulation effectiveness, assess contribution of hatchery fish to the sport fishery, and condition of game fish being caught.

Fish population evaluations by gill netting and concurrent water quality analysis are a very important component of fisheries management in the Region. Information obtained is used in many fisheries management processes. Age and growth information will help determine stocking rates in stocked waters and appropriate length and bag limits in non-stocked waters. Water quality analysis is used to determine the feasibility of stocking. In 2001, fishery evaluations were done on Lambert, Millinocket, Seboeis, Spednic, Upper Jo Mary Lakes, Abol, Crystal, Green Mtn., Little Greenland, Killman, Loon, Round, Spring, Tomah, Turtle, Upper Oxhead and Weir Ponds. Tomah Lake has been closed to fishing for nearly 40 years, because it has been used for various brook trout studies. All studies have been finished and the pond will reopen to public fishing in the spring of 2002.

An aerial angler survey was conducted on 15 lakes in the southeast portion (mostly Hancock and Washington Counties) of the Region. Results showed that overall ice fishing pressure has declined during the past few years.

Land for public access has been obtained on Farrow Lake and East Musquash Lake in Topsfield. Plans are being made to develop a public access site on the Farrow Lake land, and if the current access site on East Musquash is inadequate, the landing on that lake will also be developed.

Trapnetting is another important population sampling tool. Trapnets permit the collection of data over a longer period of time and all of the fish can be released alive. Trapnets are, however, most effective during the fall season. In 2001, salmon evaluations were done on Duck Lake, East Grand Lake, Pleasant Lake and Scraggly Lake. A brown trout evaluation was done on Nicatous. Trapnets were also set at Schoodic Lake to evaluate the lake trout population.

Trapnetting Results

East Grand Lake, Weston, Washington Co., 16,070 acres. We set our nets on September 25 at a water temperature of 18.0°c and pulled out on October 9 at 14.0°c. Since the illegal introduction of alewives into East Grand, growth of landlocked salmon has been inconsistent, as has been fishing success. There is a 2 salmon, 14-inch length limit, only 1 salmon over 18-inches regulation in effect for the purpose of increasing the proportion of older age and larger-size salmon. The stocking rate has been adjusted downward recently from 14, 000 to 12,000. Although the growth rate and the condition could be better, we are very pleased with the abundance of older IV+ and V+ salmon in the catch this fall. The average length and weight of all salmon trapped was 18.6 inches and 2.26 pounds. We took 15 salmon, or 23.1% of all salmon trapped, as V+ year old fish, with an average length and weight of 22.9 inches and 3.84 pounds. The largest salmon handled was 26.0 inches and 6.1 pounds.

Pleasant Pond, Island Falls, Aroostook Co., 1,832 acres. Nets were set on September 25 at 18.0°c and fished until October 22 at a water temperature of 13.0°c. Pleasant currently has a 1 salmon bag limit and a 14-inch length limit. It is a highly productive water that has grown some very large fish, although we took few really big fish of last fall. We set our nets early in the hopes of getting a sample quickly, but water temperatures stayed high throughout the sample period and we ended up with a 54 salmon sample. The average length and weight of all salmon trapped was 19.1 inches and 2.52 pounds. One of the larger fish taken was a VII+ year old salmon that was 27.2 inches long and 6.2 pounds.

Schoodic Lake, Lakeview Plt., Piscataquis Co., 7,168 acres. We set two nets in Rand Cove by the only known togue spawning shoal on October 10 and tended them through October 24. Lake water temperature at the onset of netting was 14.5°c, and dropped to 12.0°c when we were finished 2 weeks later. This year's netting was the most impressive so far, with 148 lake trout trapped, with no recaptures. The average size of all togue captured was 23.1 inches and 4.73 pounds. This compares very favorably to 1985, when the average size of all togue captured was 17.9 inches and 1.9 pounds, and to 1992 when the size dropped to

16.1 inches and 1.2 pounds. Schoodic Lake has always been difficult to manage for a desirable sport fishery. Smelt burlaps were moved into Schoodic for salmon and lake trout forage for many years with very unsatisfactory results. In 1992, we stopped stocking salmon, imposed liberal length and bag limits on the native lake trout population, and continued to moved smelt eggs into the system. Although we did not get what is considered trophy-size lake trout in our nets this year, we did get a number of very nice, plump togue in the 4 to 8 pound category. The largest lake trout measured was 28.7 inches and 9.1 pounds.

Duck Lake, T4ND, Hancock Co., 1,222 acres. We started trapping at Duck on October 23 and continued through November 8, with water temperatures falling from 12.0°c to 9.0°c. The lake is stocked with 600 SY salmon and 2000 ff brook trout annually. Growth and condition of salmon was very good, although we had hoped for a few older fish. We captured a total of 130 salmon that averaged 18.5 inches and 2.25 pounds. The largest fish was a III+ male that was 24.8 inches long and weighed 5.0 pounds. We also caught 11 brook trout that had an average length and weight of 13.5 inches and 1.0 pound, respectively.

Nicatous Lake, T3 ND, Hancock Co., 5,165 acres. We started the brown trout program at Nicatous in 1998. We are stocking 2,500 to 3,000 SY BNT's annually. We set two nets at the upper end of the lake on October 30 at 10.0°c, one by the outlet and the other in an area where we have had reports of good fishing. Growth and condition are excellent at all age classes, with the bulk of fish taken at age III+. The average of all fish trapped was 18.5 inches and 2.6 pounds; the III+ year-old fish averaged 18.9 inches 2.7 pounds. The largest fish handled was 20.7 inches and 3.6 pounds. The browns seemed to mature later in the fall than the salmon that we were handling at either Nicatous or Duck. When we pulled out on the 15th of November, the females were still not ripe @ a water temperature of 5.5°c. We also handled seven wild landlocked salmon that averaged 16.6 inches and 1.6 pounds.

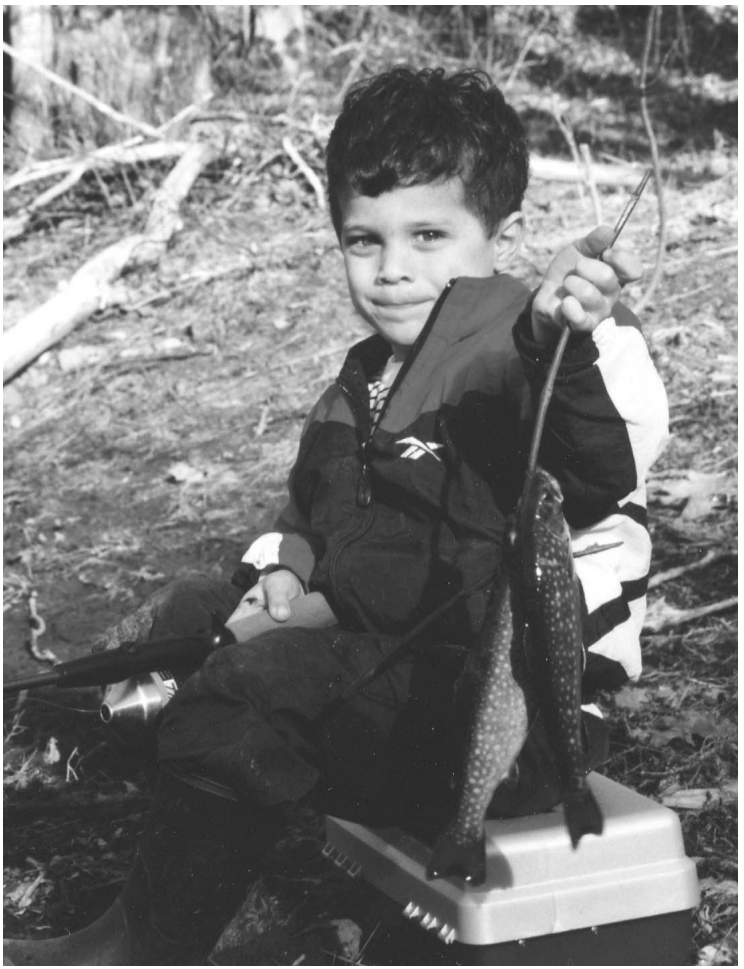
Several tributaries to Nicatous, were electrofished for brown trout reproduction. No brown trout were captured. Trout stream monitoring work was done on Gott and Lowell Brooks. Despite the below-average water flow, a fair number of brook trout were observed.

Hydroacoustics work was done on Cold Stream, East Grand, and Pemadumcook Lakes. With hydroacoustics we are able to assess smelt populations. The data are being analyzed with a report due soon.

The Region has 131 voluntary angler-record-keepers, who fished a total of 39 lakes and 13 rivers and streams both summer and winter compiling more than 2,834 days of fishing. We greatly appreciate the contributions from the anglers who fish our waters.

Temperature recording units were placed in Sourdnahunk Stream, Houston Brook, Piscataquis River, East Branch of the Penobscot River, Pleasant Pond (Island Falls), Nicatous, Pushaw, and South Branch Lake. These units record temperature data through the summer. These data help us with the management of both warm and coldwater sport fish management.

Youth fishing waters have been increased to seven. These waters are stocked on a annual basis with spring yearling brook trout and retired brook trout broodstock fish. Starting winter 2002, Jerry Pond in Millinocket opens to ice fishing for children under 16 years of age. Rocky Brook, Lincoln; Mattagodus Stream, Springfield; and Pickerel Pond, T32 MD are also restricted to children under 16 years of age. In addition to Pickerel Pond, Rock Crusher Pond (Island Falls), Giles Pond (Patten) and O'Roak Pond (Sherman) are stocked in conjunction with the Hooked on Fishing program conducted by area Game Wardens.



Fish River Lakes Region (G)

Regional staff conducted winter creel surveys on Long, Cross, Square, and Eagle Lakes in the Fish River Chain and Spider, Big Pleasant, Clear and the Musquacook Lakes in the Allagash River drainage in 2001. Angler use on these lakes was within ranges that have been observed during the past five years.

Recovery of the salmon fishery at Eagle Lake remains slow but continues on a trend toward improvement. Angler success remained high and the quality of salmon harvested continued to improve. Square Lake had slower salmon fishing as the result of the reduction in stocking and reduction in salmon stocking over the past three years to improve growth and condition of the fish resulted in slower salmon fishing at Square Lake. Signs of improved salmon quality were evident, however. Long Lake salmon fishing remained similar to past years with salmon quality still improving. The lake remains as one of the premier landlocked salmon lakes in the state but maintaining the quality of salmon enjoyed the past few years will be difficult should fishing pressure continue to increase.

Togue fishing at Clear Lake and the Musquacook Lakes remained similar to that observed during previous surveys in 1996 and 1997 whereas brook trout fishing was slower. Fishing at Spider Lake was consistent with information collected in 1999.

Fisheries personnel visited all of the fishways in the region and made recommendations for repair where necessary. An application to the Maine Outdoor Heritage Program was successful in receiving funding for an engineering study to assess the lower Fish River Falls in Fort Kent as a barrier to upstream fish passage. Considerable staff time was spent researching, preparing, and presenting information to the legislative Fish Hatchery Task Force that is reviewing the Department's hatchery facilities and stocking program.

Regional biologists have attended meetings of the Allagash Wilderness Waterway Advisory Council serving as technical advisors on fish and wildlife issues. We participated in a winter field trip to visit snowmobile access trails onto Big Eagle and Churchill Lakes to address user issues. Using information collected in a low flow study, fisheries staff was extensively involved in drafting the water management plan for the newly reconstructed Churchill Dam.

Region G biologists prepared statewide assessments for arctic charr and whitefish as part of the update of the Strategic Management Plan for Inland Fisheries. Participation was spent at several public working group sessions to discuss the statewide assessments prepared by biologists for the various inland fish species. In addition, regional staff reviewed existing sport fishing regulations and presented recommendations for new regulation proposals for the 2002 ice and open water fishing seasons. Considerable time was spent addressing the

request to open additional waters for extended fishing opportunity in October and November for coldwater fish species.

Fisheries personnel reviewed numerous applications from the Department of Environmental Protection, the Land Use Regulation Commission and the Department of Transportation for fisheries impacts making on-site visits and written recommendations as necessary. The issue of agricultural irrigation using public surface water continues to be a topic of discussion between farmers and resource protection agencies.

Region G biologists continued to monitor the brook trout fishery in Big Eagle Lake through fall trap netting efforts. To better understand the data collected in three years of trap net sampling, a review of the regulation history may prove helpful.

In 1984, the brook trout regulation changed from a 5 fish daily bag limit and minimum length limit of 6 inches (general law) to a bag limit of 2 fish but maintaining the 6 inch length limit. Trap net sampling on Big Eagle and other large lakes in 1989 through 1991 indicated that the majority of female trout were first spawning at or near a length of 12 inches. In 1992, the minimum length limit on brook trout was increased to 12 inches on several large regional lakes including Big Eagle. A regulation seeking to increase the number of older, larger trout was adopted in 1996 when angler harvest was restricted to only 1 trout exceeding 14 inches.

Average length of 421 brook trout captured from September 20 to November 5 was 13.5 inches and 15 ounces. Comparative results of the three years of fall trap netting are presented below:

Length Frequency of Captured Brook Trout

Size Range	1991 No. (%)	1996 No. (%)	2001 No. (%)
12 in. & greater	321 (53)	186 (59)	334 (79)
14 in. & greater	78 (13)	90 (29)	171 (41)
16 in. & greater	14 (2)	27 (9)	53 (13)
18 in. & greater	6 (1)	3 (1)	4 (1)

Brook Trout Age and Growth

Year	Age and Length in Inches (Sample Size)					
	I+	II+	III+	IV+	V+	VI+
1991	7.6 (1)	10.5 (32)	12.5 (56)	15.6 (14)	18.8 (3)	—
1996	7.9 (4)	9.0 (26)	12.1 (25)	14.6 (31)	16.7 (4)	—
2001	6.4 (3)	10.6 (19)	13.3 (30)	15.1 (41)	17.5 (7)	16.1 (1)

These data suggest that the wild brook trout fishery has improved under management strategies recommended by regional biologists. Continued monitoring through fall trap netting and winter creel surveys will allow staff to adjust these strategies as necessary to maintain or enhance the present quality.

Umsaskis Lake, also located in the Allagash Waterway, was trap netted for the first time this fall to monitor its wild brook trout population. Average size of 142 trout captured from September 17 through October 12 was 10.7 inches and 7 ounces.

The lake trout fishery in Umsaskis Lake is maintained by annual stocking of hatchery-reared fish. Fall trap nets captured 52 lake trout averaging 21 inches and 3.3 pounds. Ten age classes were represented in this sample, ranging from age III through age XV. Data suggest that the lake trout stocking rate may be impacting the growth of lake trout and brook trout. The stocking rate will be reduced in 2002.

Trap nets set in Long Lake in the Fish River Chain captured 91 landlocked salmon. The total number of salmon captured was down from previous seasons perhaps due to the extremely dry and warm weather conditions that prevailed during the trapping. Another factor for lower numbers may be due to increased fishing pressure known to have occurred last winter and is likely to have continued through the summer as word of the salmon quality at Long Lake spread throughout the state. The growth rate of three year-old salmon is a good indication of the overall health of the salmon population. The data below was collected using trap nets and is for three year-old salmon. Average sample size per year was 36 salmon.

Year	Avg. Length (in.)	Avg. Weight (lb.)
1981	17.1	1.8
1983	19.4	2.7
1985	21.7	3.7
1987	20.0	3.1
1994	19.8	3.1
1996	18.4	2.2
1997	18.5	2.4
1999	20.4	3.4
2000	22.0	4.1
2001	21.3	4.0

Numbers of salmon stocked in Long Lake were not stable during the entire period 1978 through 1995. Effect of these various rates are reflected in the length and weight differences of three-year-old salmon observed from 1981 through 1997. Since 1996, annual stockings have ranged from 4,000-4,500 spring yearlings. Effectiveness of this stocking rate and the special salmon slot limit regulation will be monitored through continued fall trap netting and winter creel surveys.

Special Projects

Churchill Dam Fishway Trapping

In an effort to obtain information on brook trout movement in Big Eagle and Churchill Lakes above Churchill Dam and the Allagash River to Umsaskis Lake below the dam, fisheries personnel trapped all fish passing through the fishway in Churchill Dam from May 9 through October 5, 2001. Brook trout were measured, weighed, and given an adipose fin clip prior to being released into Churchill Lake. Scales were removed from a sample of trout captured for age and growth purposes.

Preliminary review of the data indicates that 451 individual trout were captured having an average size of 8.9 inches and 6.0 ounces. Only 5 trout were recaptured moving back up through the fishway. Brook trout age and growth were determined as follows:

Age	I	II	III	IV	V	VI
Length (in)	5.7	8.0	10.9	14.3	15.6	17.2
Weight (oz)	——	2.0	6.0	6.0	15.0	27.0
Sample Size	10	38	32	18	9	1

Fish sampled other than brook trout included lake trout, cusk, round whitefish, white sucker, longnose sucker, creek chub, pearl dace, golden shiner, common shiner, lake chub, blacknose dace, brown bullhead and fallfish (chub).

General observations during the trapping period include:

1) The majority of trout movement occurred in May, June, and July. Even though surface water was cooling in September, few trout were captured moving through the fishway.

2) Larger trout that appeared to be spent adult fish were captured in May and early June. Smaller, juvenile trout were taken mid-June and July.

3) Not a single adipose clipped trout was captured during fall trap netting at Big Eagle and Umsaskis Lakes.

Brook trout captured by fall trap netting in Big Eagle Lake were given a left ventral fin clip. The right ventral fin was clipped was clipped from trout taken at Umsaskis Lake. These lakes lie upstream and downstream of Churchill Dam, respectively. The fishway at Churchill Dam will be trapped again in 2002. Trout movement between the two lakes and Allagash River will be determined by examining captured brook trout for missing fins.

Durepo Lake Reclamation

In early October, Durepo Lake, its tributaries and outlet were treated with rotenone in an attempt to eradicate an illegal introduction of largemouth bass. Durepo Lake, located in the town of Limestone, is a 65 acre artificial impoundment having a maximum depth of 25 feet. Prior to the reclamation, the lake supported a sport fishery for wild brook trout that was heavily utilized by local anglers.

Investigations by regional biologists determined that these bass were introduced as young of the year in 2001 and had attained lengths of 3-6 inches by late August. There is no other population of largemouth bass in this management region and the only smallmouth bass fishery is in another drainage 60 miles south of Limestone. This reclamation was done to eradicate the single year class of bass in the Durepo lake watershed and to eliminate a potential source of bass for future illegal stocking in other drainages within this management region.

Post reclamation investigations discovered that bass had traveled 2 miles up the major inlet, a small cold trout stream, where a hanging road culvert prevented further movement. An effort was made to treat all tributaries to this inlet upstream to the first obstruction. Bass were also observed 2 miles downstream but none were seen 5 miles downstream in a small pond on the outlet. Again, an effort was made to treat all tributaries to the outlet upstream to the first obstruction.

Several hundred bass were seen after the reclamation. Average length of bass killed was 5.0 inches with a range of 3.6 – 6.7 inches. Thousands of wild brook trout were killed in the Durepo Lake watershed during this reclamation. Observed trout sizes ranged from 2 to 14 inches. Plantings of Enneagon strain hatchery trout will now be required to support the trout fishery until it can be supplanted by natural reproduction.

Nadeau Pond Restoration/Management

Nadeau Pond is located in the town of Fort Fairfield, Aroostook County, near the Maine-New Brunswick international border. Since 1971 the Pond has been drained for the purpose of mining marl lime destined for regional agricultural fields. To allow the underlying marl to dry, a 10-12 foot trench had been excavated in the outlet stream to drain the pond to its current condition. Two small, remnant ponds have since existed and are connected by a small stream. The original mining plan allowed for extraction of lime in two claims that measured 600 feet by 1500 feet each. Restoration of the Pond level and surrounding shoreline was to be completed by May 1981 as stipulated by the plan. Allowance for continued mining at this site has been provided at various times by the Maine Bureau of Public Lands and expired in 2001. The claims-holder has finished operating at this site and will reestablish the former Pond level with a concrete/earthen outlet structure during the 2002 construction season.

The Pond originally supported a brook trout fishery of local importance. Fisheries biologists investigated the site in 1971 upon complaints of draining the Pond. Based on reports at that time, approximately 50 brook trout up to 14 inches in length had been angled from the remaining pools. Various fish species, including brook trout, are currently present in the two remaining pools but provide little opportunity for angling. Brown bullhead Ictalurus nebulosus have reached very high density and may have become established after pond draining in the early 1970s. Brown bullheads are severe competitors with brook trout, which might preclude a successful brook trout management program.

Brook trout habitat in the new pond is expected to be excellent. The Pond will have a surface area of about 20 acres, a maximum depth of about 25 feet, and a mean depth of about 9 feet. Several spring seeps can be found in the area that will be flooded, and others likely exist within the existing ponds since brook trout exist there now and spawn successfully. Sources of cool, oxygenated water are critically important for brook trout. Productivity of the new Pond will be conducive to excellent brook trout growth as deposits of marl lime still exist throughout the mostly gravel bottom.

Trout Habitat Enhancement

The MDIF&W purchased a 33-acre parcel in 2000 with about 1,500 feet of water frontage on the future pond. The purpose of this acquisition was to secure a site for public access, which would allow for management efforts to begin prior to achieving a full pond. Concurrent with the claims-holder restoring the water level, MDIF&W began efforts to enhance existing physical habitat. A management plan was prepared in April 2001 and funds were sought from local private corporations, other state agencies, and private landowners to complete the habitat work prior to water level restoration.

The MDIF&W field office in Ashland coordinated a substantial amount of construction during the 2001 season. Combined with $9,320 of State funds, we used time, heavy equipment, and materials donations of $6,700 from six different entities: two local corporations, two other State agencies, and two private landowners. Seven areas were excavated for adult habitat, in which springs were deepened and hardwood rootballs were placed for trout cover. Two trout spawning areas were constructed in which a total of 0.8 cu yd of screened pea stone was placed over springs. More than 43,000 ft^2 was deepened for juvenile trout habitat; these areas would have been 1-3 feet deep in the future pond, but were deepened to 3-6 feet. In addition to the habitat work, a public access site was also constructed: approximately 1,700 feet of road off Route 1A, a 60X150 foot parking lot, and a concrete boat ramp.

The MDIF&W will manage Nadeau Pond as a wild brook trout fishery, which will provide a new opportunity in Eastern Aroostook County where very few trout ponds now exist. After a chemical reclamation, planned for summer 2002, brook trout will be reestablished through in-drainage transfers from nearby donor waters that contain native brook trout. These transfers will occur each year during 2003-2005. The MDIF&W's objectives at Nadeau Pond are to

1) enhance in-pond habitat for all life stages of brook trout, and

2) restore a population of indigenous brook trout. Our long-term goal is to establish a self-sustaining population of brook trout that will provide a quality sport fishery and preclude the need for an annual stocking program.

Meduxnekeag River Habitat Survey

The Meduxnekeag River located in southeastern Aroostook County supports important sport fisheries for wild brook and brown trout. Like many other waterways in Maine, this River has probably undergone intensive degradation due to human-induced impacts throughout the watershed. Activities such as development, forestry, and agriculture have changed the natural water flow regime of the Meduxnekeag such that the physical habitat that trout need has changed. The influence of non-point source pollution in the watershed is readily seen during spring snowmelt or after a heavy rain shower in summer: water in the river and its tributaries turn "chocolate" brown.

In July 2001, the MDIF&W Fisheries Division office in Ashland coordinated an intensive habitat survey of the River that involved eighteen people from four agencies, covered 16 miles of mainstem and tributaries, and spanned 5 days in the field. Personnel from IF&W, the University of Maine, Houlton Band of Maliseet Indians, and the Atlantic Salmon Commission participated in the survey.

Data collection involved crews of 4-5 people assigned to a 1-2 mile reach of river each day. Data on stream width, water depths, water velocities, substrate size and condition, spawning habitat for trout, general habitat type, pool types and condition, riparian habitat, overhead shade, and tributary locations and types were recorded. Future habitat survey work in the watershed will focus on important cold-water tributaries including B Stream, upper reaches of Big Brook, Smith Brook, Pearce Brook, and several unnamed brooks. The survey data will complement the extensive creel survey and electrofishing data collected by IF&W during the 1980s and early 1990s to help manage the River's sport fisheries for trout.

Observations during the survey by several fisheries biologists indicated what the final data analyses might reveal for the mainstem River:

1) a general lack of pools,

2) the apparent over-widened condition resulting in very shallow water, and

3) the immense amount of silt and fine sediment that was either covering or had mostly filled in the small spaces between rocks in the stream bottom that trout need for spawning and hiding cover. A complete analysis of the data and a report will address issues of future trout management and the potential for habitat restoration.

Performance of Splake in Maine Waters

Summary

The Fisheries Division began a 5-year study to evaluate the performance of splake in Maine lakes in 1990. Recommendations were made to continue the study with modified objectives in 1994. The new objectives included evaluating of hatchery-reared splake with regard to longevity, natural reproduction, competition with other salmonids, and the effects of special regulations.

The majority of splake mature by age III+ in Maine. However, no evidence of natural reproduction was documented in Maine. An extensive review of scientific literature from other states and countries indicates there is no credible evidence of successful splake reproduction occurring in the wild. The only reports of successful splake reproduction occurred in the hatchery environment.

There is a considerable overlap in food habits of splake and landlocked salmon. Both rely heavily on smelts at certain times of the year. However, there was no significant decline in growth rates of salmon after the introduction of splake. In fact, growth rates increased significantly for some cohorts at Kingsbury Pond.

The evaluation of special regulations, designed to improve longevity, was hampered by a change in the parental strains. Recently, splake from wild strain crosses were much smaller than previous domestic strain crosses and they exhibited poor survival in many lakes around the State. Waters with a 2 fish bag limit and 12 in minimum length limit with only 1 exceeding 14 in saw an increase in the number of older fish when harvest and hooking mortalities were not excessive. One water with a 2 fish bag limit and 8 in minimum length limit did not show any improvement in the number of older splake. High-quality fisheries were created on the two study waters with a 1 fish bag limit and a 16 in or 18 in length limit. Splake exceeding 5 lbs were sampled in these study waters. Catch rates were lower than on other waters with more liberal regulations.

There was no apparent relationship between stocking rates and growth rates on a statewide basis. This was expected because splake waters have varying water quality, levels of competition with other species, and harvest rates which make lake to lake comparisons difficult.

Interim Summary Report 01-3 by Timothy C. Obrey

Rangeley Lake Fishery Management[1]

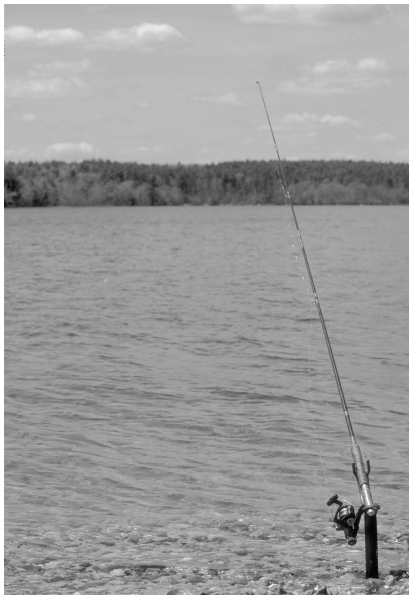
Summary

Rangeley Lake, located in Western Maine's Franklin County, provides an exceptional fishery for landlocked salmon. This 6,000-acre lake has a one-salmon daily bag limit, and is closed to ice fishing. The fishery is primarily dependent on annual stockings thought wild fish make up a portion of the catch.

The salmon population was monitored by annual fall trap nettings at the Outlet and by annual voluntary angler surveys. Voluntary angler records indicated continued excellent catch rates 1.3 legal salmon per angler in 2001; 69% of the anglers caught at lest one legal-size fish, and they continued to release a high proportion of the legal catch. Both voluntary angler data and samples from the Outlet indicated that salmon growth rates declined moderately in 2001. Wild salmon accounted for 22% of the trapnetting catch at the Outlet; older salmon (age IV+ and greater) accounted for 30% of the catch.

Spring-yearling brook trout have been stocked in relatively small numbers at Rangeley Lake in recent years. Voluntary angler records confirm that these fish are continuing to contribute to the fishery, and we will continue to stock them as long as smelt, the primary forage base, remain abundant.

[1]Interim Summary Report No. 02-1 by Forrest R. Bonney



Chamberlain Lake Wild Brook Trout Study

Chamberlain Lake, an 11,084-acre oligotrophic lake with a maximum depth of 154 feet, is located NEAR the headwaters of the Allagash River. It is the largest lake in the Allagash Wilderness Waterway, and one of the deepest lakes in northern Maine. Chamberlain Lake supports very popular winter and summer fisheries for indigenous populations of brook trout, lake trout, lake whitefish, and burbot (cusk).

In the fall of 2001, we began a comprehensive evaluation of Chamberlain Lake's brook trout population. This study involved a partnership between the Maine Department of Inland Fisheries and Wildlife and the Allagash Wilderness Waterway. A grant from the Maine Outdoor Heritage Fund made the project possible.

The first phase of the study took place from September 9 through October 25, 2001. During this period, trapnets were used to catch brook trout along the shore. At the time of capture we checked all brook trout for maturity, we recorded a length and a weight for each individual, and we took scales to determine the ages of a sample of the trout catch. Before releasing the trout back to the water we marked all of them with a temporary upper caudal fin clip. We also marked all trout over 12 inches, the legal minimum length limit at Chamberlain Lake, with an adipose fin clip. The adipose fin was removed from trout greater than 12 inches so that we can identify them during a winter survey.

During the 2-month period, we fished up to seven trapnets in 21 different locations for a total of 5,976 hours. We captured 350 brook trout. Seventeen of the trout died, a netting mortality rate of 5%. All brook trout captured during the study averaged 14.2 inches in length, and 20.3 ounces in weight. Seventy-five percent of the brook trout were greater than 12 inches; 14% were greater than 18 inches. Of the 350 brook trout, 20% weighed more than 2 pounds, and 4% were greater than 3 pounds.

Based on external physical appearance, only one trout less than 12 inches was sexually mature. This information is important because it indicates that a minimum length limit of 12 inches on Chamberlain Lake is an effective regulation that allows females to attain spawning size before being vulnerable to harvest.

After determining the ages of 120 brook trout from the fall trapnetting sample, we found individuals as old as age seven. Brook trout less than 12 inches were younger than age three. Fish age 3 and older comprised Chamberlain Lake's adult trout population.

The second phase of the study will take place during the January 1st – March 31st, 2002, ice fishing season. Winter anglers will be contacted and interviewed in

search of brook trout that were marked this past fall. Returns from the 257 legal-size marked brook trout at large in Chamberlain Lake will allow us to estimate the size of Chamberlain Lake's adult brook trout population. Additional information obtained from anglers will be used to determine catch rates, average size, food habits, and the exploitation of brook trout. This information will make a very important contribution to the management of Chamberlain Lake's brook trout fishery.

Stephen Seeback and Jason Seyfried

Performance Study of Two Wild Brook Trout Strains Introduced as Broodstock in Maine's Hatchery System

Summary

In 1996, the Maine Department of Inland Fisheries and Wildlife's Fisheries and Hatcheries Division began a new program to replace the existing brook trout hatchery stocks. Years of using insufficient numbers of fish in breeding established hatchery broodstocks had led to a decline in egg and fry quality. Mature fish had also begun to exhibit physical and progenitive deterioration. Longevity of stocked hatchery fish was not generally more than 2 years. Two new strains were chosen from two bodies of water with abundant fish populations and accessibility for wild spawning operations. Genetic sampling using microsatellite DNA testing was done on fish collected from Kennebago, Sourdnahunk, and Ross lakes as a comparison model to determine specific genetic differences between these three bodies of water and their respective watersheds. Tests showed that all three bodies of water have distinctive genetic populations. Each body of water also exhibited heterozygous populations of their own. This specific genetic mapping would provide fish culturists with a standard model in which to compare genetic variability and viability of future hatchery stocks.

The hatchery program in conjunction with a fisheries study designed to evaluate the performance of these two strains determined which single strain should replace the problematic Maine Hatchery Strain.

While both strains shared comparable traits in the production environment, the Kennabago strain exhibited superior qualities of growth and longevity as a broodstock. The Kennebago strain spawned earlier and in a much narrower time frame than did the Sourdnahunk strain. The Sourdnahunk strain suffered greater mortalities throughout all mature age classes. The earlier swim-up and initial growth advantage of the Kennebago strain were also critical factors that determined their preferability.

Progress Report 01-3 by Chris Short

Brook Trout Brood Stock Selection

After six years of comparative studies between the Kennebago and Sourdnahunk strain of brook trout, the Kennebago strain was selected as the strain best suited for our overall needs.

Field comparisons indicated the Kennebago's were more successful in waters which received paired stockings of the two strains. They were more abundant, showed up as older aged fish and were of larger size.

In the hatchery environment the most important factor was that Kennebago fish spawned a full month ahead of the Sourdnahunk. This allows a tremendous jump in early fry development resulting in larger fish at the time of stocking.

Now that a brood stock strain has been selected hatchery staff can concentrate on providing optimum condition for rearing the quality fish needed for management programs.

Governor Hill Hatchery Update For the past four years hatchery staff and Department engineers have been upgrading the Governor Hill Hatchery egg incubating and fry rearing system. New wells, pipelines, oxygenation system and rearing tanks have been installed as time and money allowed.

This winter the system is up and running. The well water system will allow for much advanced fry growth which will result in larger more robust fish available for stocking. This is needed to meet the ever-increasing demand for larger fish that are adaptable to a wide range of habitat.

2001 Stocking Season

The 2001 stocking season resulted in the highest total poundage ever released by our hatchery system 1,204,722 fish totaling 261,100 pounds were released into more than 750 different stocking locations statewide. The totals by species follows:

	Number of Fish Stocked	Pounds of Fish Stocked
Brook trout	784,237	141,857
Landlocked salmon	118,230	24,498
Brown trout	154,443	61,827
Lake trout	22,960	9,871
Splake	90,437	17,065
Rainbow trout	34,415	5,982
Total Stocked	**1,204,722**	**261,100**

The fish ranged in size from 2 - 26 inches. Many large fish were released as "retired" brood stock totaling 7,281 fish weighing 24,454 lbs. These stockings have become very popular with anglers. Efforts will be made to have a number of these larger fish available for release around the state each year.

Black Bass in Maine

Their Life History and Management History

Black Bass Life History

The term "black bass" is a common name applied to several species of centrarchids (sunfishes), of which Maine's smallmouth bass (Micropterus dolomeiu) and largemouth bass (Micropterus salmoides) are members. This plan deals only with smallmouth and largemouth bass, which will be collectively referred to in this plan as black bass or, simply, as bass.

As their names imply, the two species can be distinguished on the basis of mouth size. The maxillary bone of the upper jaw of the largemouth bass extends beyond the eye, whereas the maxillary of the smallmouth does not extend beyond its eye. Other external physical differences exist between the two species, such as coloration and the separation between the spiny and soft dorsal fin, but these are less reliable identifying features than jaw size. Smallmouth and largemouth bass also differ in behavioral and physiological characteristics of importance to their management; these will be discussed later.

Smallmouth Bass

Smallmouth bass thrive in many of Maine's lakes and ponds, as well as in many larger rivers and streams, except in extreme northern Maine. The northern limit of their range in Maine is based on whether first-year bass achieve adequate body size and weight to survive the approximately 200+ day starvation period encountered during the first winter, when water temperatures cooler than 50° F result in cessation of feeding and growth.

Stable water levels during spawning and suitable shoreline spawning gravel, usually interspersed with cover, are important to the reproductive success of smallmouth bass. Male smallmouth bass mature at 3 to 4 years of age, while female bass mature by age 4 or 5. Size at maturity ranges from 8 to 12 inches. Male bass usually mature at a smaller average length than females.

The effective fecundity of female smallmouth bass has been estimated to be from 2,000 to 3,000 eggs per pound. Although total eggs in females may approximate 7000 – 8000 per pound of body weight, female bass do not release all the eggs in the ovaries during each spring's spawning, as evidenced by angler observations of many eggs remaining after spawning is concluded. In Maine, most smallmouths spawn between mid-May through mid-June, depending on location and water temperatures. Nest construction, done by males, generally occurs as water temperatures rise above 55° F, with egg deposition occurring at water temperatures between 60-66° F. Nests are usually constructed in shallow water near cover from rocks, logs, stumps, or sharp drop-offs.

Parental care is highly developed, with protection of the eggs and fry being practiced by the male only. Females leave the nest after egg deposition, while males remain to guard the eggs and fry for a few weeks. The fin movements of the male bass serve to prevent silt deposition on the eggs and also keep the eggs oxygenated. Hatching occurs within about 5-8 days at water temperatures common to most Maine waters.

Male bass are very sensitive to water level changes during the spawning period, and a relatively small draw-down may cause abandonment of many nests and certain loss of eggs or fry. Similarly, cooling water temperatures during the spawning period may produce nest desertion by the male, with mortality of eggs or fry. Although re-nesting may occur later as water temperatures warm or as water levels are restored, the progeny of later spawning bass may not experience an adequate growing season for suitable growth to survive the first winter. In most Maine waters where spawning occurs at the normal time, populations of young smallmouth bass typically reach average lengths of 2.2 - 2.9 inches by the end of their first growing season, although some fast-growing individuals may reach lengths of 4 inches. There is a direct relationship between size and over-winter survival in first-year smallmouth bass, with larger bass experiencing a higher survival rate.

The male's aggressiveness in protecting the nest makes him especially vulnerable to being hooked by anglers during the reproduction period. Removal of the male by angling can result in predation or other forms or mortality to the unprotected eggs or fry.

The combination of the high number of eggs spawned by females, coupled with a high degree of protection of the eggs and fry by the male, results in a high reproductive potential for smallmouth bass. Because of this, stocking of smallmouth bass is rarely necessary to maintain healthy populations after they are initially established.

Largemouth Bass

Although largemouth bass occur in a variety of habitats in Maine, they thrive in shallow, weedy areas of eutrophic and mesotrophic lakes, and slow-moving rivers and streams. This species grows best in waters with average summer temperatures in the high seventies.

Largemouth bass spawning behavior is initiated in the late spring and early summer as water temperatures exceed 60°F. Shallow weedy areas and areas adjacent to stumps are commonly selected for spawning, and nests are often less elaborate than those of smallmouths. Male largemouths fan superficial silt from the bottom, creating a shallow depression, or "bed", in which the eggs are deposited. Egg deposition occurs at water temperatures around 63° F. Eggs sink

to the bottom of the nest and adhere to substrate. Females spawn some of their eggs, then they depart. They may return to spawn again with the same male or may spawn in other nests with additional males.

The fecundity of largemouth bass is high; mature females may produce 2,000 to 20,000 eggs per pound of body weight. The female bass leaves the nest shortly after the eggs have been deposited and fertilized, while the male remains near the nest for several weeks, guarding the eggs and fry. Hatching occurs within a few days to a week, depending on water temperatures. Large fluctuations in water temperatures during incubation may result in nest desertion by the male largemouth and in heavy egg mortality. Re-nesting usually occurs once water temperatures have warmed to suitable levels.

Both smallmouth and largemouth bass in Maine may become infected with the bass tapeworm, Proteocephalus ambloplites. Extreme caution should be exercised to prevent the introduction and spread of this parasite into new waters. Bass tapeworm can be spread by fish species other than bass.

The high fecundity of female black bass (both smallmouth and largemouth) and the protective behavior of the male toward his progeny, plus the low fertility of most Maine waters and our short growing season, combine to produce bass, which generally are slower growing than their counterparts in southern states. This fact may be crucial to Maine bass management because anglers who fish for bass in Maine are commonly attracted to the prospect of capturing “trophy size”, hence, old bass. In short, the attraction of older, larger fish may result in their being more easily exploited by anglers than faster-growing, younger bass from southern United States waters.

Species Management History

Smallmouth Bass

Smallmouth bass are not native to Maine; they were first introduced in 1869. Cochnewagon Pond, Phillips Pond, Newport Pond and Cobbosseecontee Lake were among Maine’s first waters to receive smallmouth bass. The bass for these introductions were probably obtained from New York waters. Smallmouth bass have since been introduced, either legally or illegally, throughout much of the State. They now occur in 471 Maine lakes and ponds. In 240 of these 471 waters, smallmouths are the only species of bass; in 231 waters, smallmouths coexist with largemouth bass.

Smallmouth bass waters are located primarily in the lower two-thirds of Maine, as shown in Figure 1. They are not found in the upper sections of Somerset, Piscataquis, or Aroostook Counties.

Smallmouth bass populations in Maine sustain themselves by natural reproduction, and stocking is unnecessary, except occasionally in rare situations. Some Maine waters, especially those in eastern Maine, have an abundance of spawning habitat, and smallmouth bass populations are maintained at high levels. Other waters may need a higher minimum length limit on bass to sustain the desired population abundance, such as lakes where harvest levels need to be restricted, or where spawning habitat is limited, and bass populations are less abundant.

Largemouth Bass
Largemouth bass are not indigenous to New England. Due to widespread introductions they are currently found in all New England states, in many waters throughout the United States, and in other countries.

The first largemouth bass introduction in Maine probably occurred incidentally with planned introductions of smallmouth bass during the late-1800's. The first recorded largemouth introduction in this state was in Forbes Pond, Gouldsboro in 1897. Some of the other large lakes where largemouths were first successfully established were Great Pond and Messalonskee Lake, both in the Belgrade Lakes Region.

Most introductions of largemouth bass during the early 20th Century were made by the Maine Department of Inland Fisheries & Wildlife, using bass reared at a federal hatchery. Over half of Maine's total largemouth bass introductions have been made since 1954. The fish for more recent authorized stockings have been obtained from Maine's lake and pond bass populations.

Largemouth bass have since been introduced, either legally or illegally, throughout much of the southern half of Maine. Their distribution is shown in Figure 2. They are not found in Piscataquis or Aroostook Counties, or in the upper sections of Somerset, Franklin, and Penobscot Counties.

Largemouth bass now occur in a total of 372 Maine lakes and ponds. In 141 of these waters, largemouths are the only species of bass; in 231 waters, they coexist with smallmouth bass.

Largemouth bass populations in Maine sustain themselves by natural reproduction, and stocking is unnecessary. Some waters may need a higher minimum length limit to sustain the desired population abundance, such as lakes where spawning habitat is limited, and bass populations are less abundant.

Bass – both species
Early fishery managers were highly enthusiastic about bass because they are easily caught, are excellent fighters, and are very palatable. Bass are highly

important in terms of their high value as a popular sportfish. Many states regard bass as the number one sportfish, in terms of popularity with anglers.

In Maine, bass are considered to be one of our most important sportfishes, along with brook trout and landlocked salmon. According to an angler questionnaire survey conducted by the Department in 1983, angler effort expended annually on black bass, was exceeded only by brook trout and landlocked salmon. More recent data from the Department's summer 1999 Open Water Fishing Survey (Paterson, et al, 2001) found that bass ranked highest of all Maine sportfish in three important areas:

1. largest number of anglers,
2. most angler-days of use,
3. most frequently caught species.

Table 1 compares angler use from 1983 to 1999.

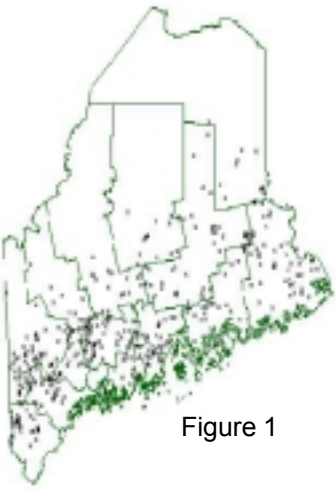


Figure 1

Figure 1:
Distribution of Smallmouth
Bass in the Lakes and Ponds of Maine,
Year 2000.

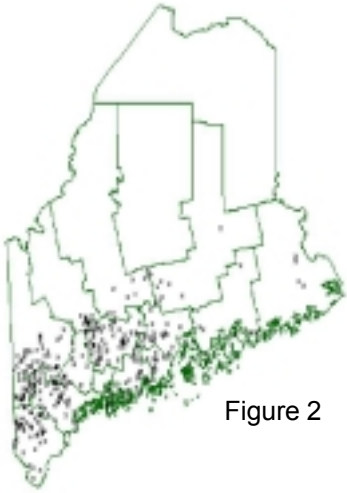


Figure 2

Figure 2:
Distribution of Largemouth
Bass in the Lakes and Ponds of Maine,
Year 2000.

Figure 3: Distribution of Principal Fisheries for Black Bass in the Year 2000

Table 1: Angler use comparison, 1983-1999.

Species	1983 effort (angler-days)	1999 effort (angler-days)
Bass (smallmouth and largemouth)	1,200,000	2,173,000
Brook trout	1,470,000	1,633,000
Landlocked salmon	1,250,000	1,505,000

Due to the increased popularity of bass in recent decades, numerous unauthorized, illegal introductions of bass by anglers have occurred. This activity has altered fish populations and ecosystems in some Maine waters and watersheds, sometimes with deleterious effects. To prevent potential problems all requests for introduction of new species should be initiated through the regional fisheries biologists.

Bass Regulations History

Maine's first open season for bass fishing was July 1, 1877 to March 31, 1878. There were no restrictions on length, bag, or weight limit.

During the period 1898-1906, there was a closed season while bass were "on the spawning beds", but no dates were given. Although there was no statewide general law bag limit, a 12-inch minimum length was established on 15 waters, mostly in the Belgrade Lakes region.

From 1907 to 1913, the minimum length was changed to 10 inches. An ice fishing season was established for bass in 1914 from February 1 to March 31.Open water season dates were July 1 to September 30 for lakes, rivers, and streams. A 15-pound weight limit and a 25-fish bag limit (in the aggregate with 4 other species) were established. The minimum length limit remained unchanged until 1988. The 25-fish bag limit (aggregate) remained in effect from 1914 to 1950. The limit dropped to 15 fish in 1951, to 12 fish from 1963 to 1966, and to 8 fish until 1979, with an exception allowing only 5 fish in the winter of 1978.

Between the mid-1920's and 1975, the open water season for bass in Maine lakes was from June 1 to September 30. From June 1-20, representing the bass spawning season, fishing was by artificial lures or fly fishing only with a bag limit of 3 bass per day.

Between the 1940's and 1987 the general law fishing season ended on August 15 on brooks and on September 15 in rivers and on September 30 in lakes and ponds. From 1967 to 1977, bass could be taken in the winter only in waters legally

open to ice fishing.

From 1979-1991, a 5-bass limit was established, except that no more than 3 bass could be taken during the period April 1-June 20, by artificial lures only. Between 1979-81, bass were not included in the aggregate bag limit but were included in the aggregate weight limit. From 1982 to 1996, bass had a separate weight limit. In 1997, the weight limit was abolished.

In 1992, Maine promulgated its present statewide general law bag and length limits. From January 1 – June 20, the bag limit is 1 per day. From June 21 – September 30, the bag limit is 3 bass, with only 1 bass over 14 inches.

The general law length limit on bass was increased to 12 inches in 1988, but later reduced to 10 inches in Washington, Hancock, Aroostook, and Piscataquis Counties.

The Lake Trout In Maine
Its Life History and Management History

Life History

Description

The lake trout (Salvelinus namaycush) lacks the distinctive coloration of its close relative, the eastern brook trout. Lake trout are usually either dark green or grayish brown in color, with white or pale yellow bean-shaped spots. In clear waters lake trout are often so silvery that the white spots are difficult to see. In stained waters they are very dark, almost black. Generally, a narrow border of white is present along the anterior margins of the pectoral, pelvic, and anal fins. This is most pronounced during spawning; however, at no time is this border as accentuated as it is on the fins of the brook trout. Lake trout fins are not orange or orange-red, like those of the brook trout.

Distribution

Lake trout are distributed throughout Canada. In the United States their natural range was restricted to northern New England, the Great Lakes, New York, Pennsylvania, Michigan, Minnesota, Montana, Idaho, and Alaska. In Maine they were originally found in about 100 lakes throughout the State. However, lake trout have been successfully reared in hatcheries. Consequently, their range has been extended considerably in the United States. In Maine they have been introduced into waters from Aroostook County in the north, to York County in the south. Throughout their native range lake trout are known by a wide variety of common names. In Maine they are called togue, whereas in other parts of the country and Canada they are referred to as mackinaw, salmon trout, lakers, grey trout, namaycush, Great Falls char, or mountain trout.

Habitat Requirements

Although lake trout are found in river systems and shallow lakes throughout northern Canada, their typical habitat consists of large, deep, coldwater lakes with irregular bottom contours and rocky shorelines. During the winter and spring, and again in the fall, when water temperatures are cool, lake trout are often found in shallow water around the shore. When surface waters warm in late spring and summer, they retreat to deeper water. Because lake trout require good water quality, they are most abundant in lakes with large volumes of deep water where temperatures remain 60°F or less throughout the year, and where levels of dissolved oxygen exceed 6 parts per million. Suitable spawning habitat is essential for self-sustaining populations through natural reproduction.

Reproduction

Lake trout spawn in the fall during the period from mid-October to mid-November. In northern Maine waters spawning occurs in October, and in southern Maine waters it occurs as late as November. Lake trout prepare to spawn as surface water temperatures cool below 60o F. Mature fish typically congregate near

exposed, shallow shoals or rocky shorelines. Spawning occurs at night, at depths usually less than six feet, and sometimes only a few inches. They often spawn within 30 feet of shore over broken ledge, large rocks, boulders and/or rubble ranging in size from 5 inches to 25 inches in diameter. Eggs are broadcast over the bottom where they settle and become sheltered in the crevices among the rocks.

Suckers, eels, bullheads, some aquatic insects, and crayfish will prey on lake trout eggs. However, the effects of this predation are probably of minor consequence if other environmental factors remain favorable. Lakes with large lake trout populations, where suitable spawning habitat is abundant, and where winter lake levels remain constant, have the best potential to maintain stable populations.

Eggs spawned in the fall incubate over winter under the ice, and hatch in 5 to 6 months, usually in April. The young remain among the crevices in the rocks until they absorb their yolk sacs. When they are able to swim and take food they move out into deep water.

Food Habits

During the lake trout's early years of life, its diet consists mainly of insects and crustaceans. In many Canadian waters the opossum shrimp Mysis relicta is an important food item for young lake trout. Individuals begin to feed on fish when they attain lengths of 8 to 10 inches. Once lake trout begin to feed on fish, they can adapt their food habits to utilize many sources of forage. Their growth and condition is dependent upon the type and abundance of forage available. In Maine, lake trout historically fed on whitefish, suckers, minnows, sunfish, slimy sculpins, white and yellow perch, cusk, and sticklebacks. It is important to note that smelts did not occur in waters with Maine's native lake trout populations. Where smelts have been introduced; however, lake trout feed on this species almost to the exclusion of all other forage, no matter how abundant other suitable species seem to be. It is not known whether this phenomenon is the result of a preference for smelt by lake trout, or simply a matter of smelts being easier prey.

When forage fish are not abundant, lake trout will feed on plankton and insects throughout their lives. Under these conditions growth is usually slow. Individuals in these populations do not attain the large sizes observed in populations that feed on fish, and they often mature at smaller sizes. Many people believe that these lake trout are of higher quality for eating than those that feed on smelts or other forage fish.

Although food habit studies do not indicate that small lake trout comprise a significant food item in the diet of adult fish, lake trout will prey upon their young, and especially upon newly stocked lake trout for a short period after stocking before the young fish have an opportunity to disperse throughout a lake.

Age, Growth, and Maturity

The lake trout is the second largest member of the salmon and trout family. In 1961, a lake trout weighing 102 pounds was caught in a gill net in Lake Athabasoc, Canada. The North American rod and reel record is 72¼ pounds, taken in 1995 from Great Bear Lake, Northwest Territories, Canada. The largest lake trout taken recreationally from United States waters weighed 61½ pounds. It was caught in Michigan waters of Lake Superior. Maine's rod and reel record fish of 31½ pounds was caught in 1958 in Beech Hill Pond, Hancock County. But such large fish are exceptions, rather than the rule. In most waters, even those where lake trout live under optimum conditions, most adults do not commonly attain weights over 5 pounds.

For the first 6 years of their lives lake trout grow at a rate of 2 to 4 inches per year. However, as individuals mature their growth rate slows, often to an inch or less per year beyond age 7 or 8. Males usually mature at younger ages and smaller sizes than females. There is considerable variation in both age and size at first spawning among Maine's lake trout populations. Some males mature as early as age 5 at lengths of 16 inches, but most will not mature until age 6 at lengths from 16 to 18 inches. Females will mature as early as age 6, and sometimes at lengths of 18 inches, but most do not mature until age 7 or 8 at lengths of 20 inches and longer. Although males may spawn every year, females often spawn only once over a 2 or 3 year period.

The life span of the lake trout also varies considerably, but the species is the longest-lived of all salmonids. Individuals over 20 years in age are not uncommon in Maine, and fish over 25 years old have been recorded.

Management History

The lake trout is one of Maine's most popular and important coldwater game fish species. It utilizes a variety of forage species, and can exist with other game fish populations. In the winter, they provide good action throughout the entire ice-fishing season, and can be caught by inexperienced as well as veteran anglers. For a short period after ice-out in the spring lake trout can be taken near the surface with light tackle. After that they move into deep water where, until recently, special angling techniques have been required to provide fishing success. Advances in fishing technology, especially depth finders and downriggers, have improved chances for successful summer lake trout fishing for many people. Their excellence as a food fish, relative freedom from disease and parasites, adaptability to suitable environments, attractiveness as potential trophy game fish, and responsiveness to management are all qualities that make lake trout a valuable native Maine fishery resource. Over the past 50 years much has been learned about managing this species.

Protecting Wild Stocks

Wherever self-sustaining populations of lake trout occur fishery management emphasizes protecting these wild fish resources. Due to undocumented stockings that occurred throughout the early 1900's, it is impossible to determine the exact natural distribution of lake trout in Maine. Over the years, stocking has certainly increased their distribution and abundance throughout the State, and has created self-sustaining populations in waters where none occurred naturally. A review of all stocking records to date, and careful consideration of the location of waters stocked with lake trout in relation to other lake trout waters where no stocking records exist, indicates that 30 waters, totaling 37,061 acres, have never been stocked or influenced by fish stocked either upstream or downstream in the drainage. These are Maine's last pure wild populations. They represent 22% of the total number of Maine's present lake trout waters, but only 10% of the total acreage.

In order to protect the genetic integrity of these lake trout, a Fish and Wildlife Department policy recommends no stocking of other predators, competitors, or prey in any of their waters. Other recommendations in the policy include protecting the aquatic and riparian habitat that supports these populations, routinely monitoring water quality in these waters, and preparing regulations appropriate to insure both spawning escapement and protection of older age classes in each population. The policy also recommends, as funding permits, a systematic program of genetic analysis of each native wild population to determine the degree of genetic variability among the populations.

Stocking

Lake trout have been stocked to maintain populations where natural reproduction is inadequate to maintain satisfactory fisheries, or to create new fisheries through introductions into waters with suitable habitat. Both management techniques have been successful. When stocked in suitable habitat in appropriate numbers and at appropriate sizes, lake trout can compete successfully with non-sport species and provide satisfactory fisheries in the presence of other game fish, both coldwater and warmwater. This adaptability has been especially important in the southern and central parts of Maine where lake trout fisheries have been created by introductions into waters where they did not naturally occur.

Over the years production of lake trout in Maine hatcheries has varied in response to the availability of acceptable brood stock and/or eggs, as well as to the management programs and recommendations of regional fisheries biologists. In the 1930's and 1940's, as many as 1,065,000 lake trout fry, plus 24,000 spring yearlings, were stocked annually in 15 to 20 different waters. Through the 1950's, the number of fry stocked decreased and the number of spring yearlings increased as fishery management studies indicated that spring yearlings provided better returns to anglers. By 1960, all routine lake trout stocking involved spring yearlings. That year, 203,000 lake trout were stocked in 24 lakes. Through the

1960's and into the early 1970's, annual stockings increased to more than 400,000 spring yearlings in more than 50 lakes throughout the state.

Since the late 1970's, improvements in the size and condition of spring yearlings reared in Maine hatcheries, combined with improvements in the transportation and methods of stocking fish, greatly increased post-stocking survival, and the number of fish stocked each year has decreased in response to the improvements observed. In 1980, about 200,000 spring yearlings were stocked in 55 lakes; by 1985 only 58,000 were stocked in 41 lakes; and by 1990, 31,400 in 43 lakes. This trend continued through the 1990's. During the period 1991-95, an average of 38,500 spring yearlings per year were stocked in 37 waters, but from 1998-2000 an average of 28,350 spring yearlings per year were stocked in 21 waters.

Over the years, the lake trout reared in Maine's hatcheries have originated from many sources. Eggs have been procured from out of state, most recently from New York in order to obtain a deep spawning strain from the Finger Lakes to use in deep lakes like Sebago, where severe over winter drawdowns occur. Most lake trout for Maine stocking programs; however, have originated from brood stock created from eggs taken in the wild from Maine lakes, most notably Allagash Lake, Cold Stream Pond, and Lower Wilson Pond. At the present time, due to the low annual demand for spring yearling lake trout, and the modest demand for lake trout eggs to create splake, the lake trout-brook trout hybrid, plans call for continuing to use captive brood stock developed from the wild in Maine waters.

Management experience indicates that, in addition to stocking lake trout at appropriate sizes, stocking them at rates commensurate with the ability of individual waters to grow them is essential if stocked fish are to produce satisfactory fisheries, and not adversely influence management for other coldwater species that are present. Lake trout are now stocked as spring yearlings that average about 7¼ inches (about 7½ per pound) at the time of stocking. Stocking occurs while surface water temperatures are still cool, usually in May. The amount of suitable and productive habitat available during the summer must be considered in stocking lake trout. In the summer, water less than 40 feet deep is usually too warm for lake trout, and water deeper than 100 feet is not very productive. Therefore stocking is based on the area in a lake with depths between 40 and 100 feet deep. Up to 5 spring yearlings are stocked per acre of water with these depths. Factors that also influence the number stocked in each water include forage abundance, the presence of predators, and the potential for competition between lake trout and other salmonids managed in the same body of water. Although most waters are stocked annually, in recent years there has been some movement toward less frequent stocking in order to avoid stockpiling these relatively slow-growing fish and to avoid negative impacts that stockpiling has on growth and condition of all predators in a body of water.

Regulations
For many years Maine's lake trout populations were managed and maintained with liberal fishing regulations. However, during the past 50 years increases in leisure time and angler mobility, improvements in access to many areas, and improvements in fishing gear and fishing techniques have contributed to increases in the amount of fishing for lake trout as well as harvests of the species. Statewide, "general law" regulations have changed in response to this. Since 1950, when a 25-fish bag and possession limit was in effect, bag limits have been reduced 5 different times. The present general law bag limit permitting only 2 lake trout per day dates back to 1982.

Under most conditions, the lake trout is a relatively slow-growing, late-maturing fish. As more was learned about the growth and maturity characteristics of Maine populations, longer minimum length limits were recognized as necessary to maintain or increase the number of mature spawners. Although a 14-inch general law length limit prevailed in Maine until 1978, in 1972 a special 18-inch minimum length limit was established for Moosehead Lake to aid the recovery of its wild lake trout population. Higher length limits followed on many other waters throughout the state, including a 20-inch minimum length limit at Hopkins Pond in Hancock County to help restore an over-exploited wild population there. The general law length limit was increased from 14 inches to 16 inches, beginning in the winter of 1978 for ice fishing seasons, and in the summer of 1979 for open water fishing seasons. In 1982, the general law length limit was increased again to the present 18-inch minimum length for both the ice and open water fishing seasons.

The present general law regulations have been very successful in maintaining most of Maine's lake trout populations, in some cases a little too successful. Increased spawning escapement resulting from the 18-inch limit established in 1982 produced more wild fish in some waters, resulting in large numbers of young wild fish, which "stockpiled" under the 18-inch minimum length. This has had a negative impact on the available forage, usually smelts. In some waters it has even affected the management of other species. In response to this, decreases in length limits, often combined with increases in bag limits, have been used to encourage harvesting the overabundance and help restore a balance within each lake trout population, as well as a balance between predators and their prey in each water.

Standing Stocks and Harvest Management
Sufficient data are not available to allow a useful estimate of the number of legal-size lake trout that are present in Maine waters. Recent population studies in Maine, and the results of studies elsewhere in the United States and Canada, indicate that even the best lake trout habitat often supports no more than one lake trout 18 inches and larger per surface acre of water.

It appears that the abundance of fish of this size typically ranges between 0.4 and 0.8 lake trout per acre, depending on such factors as the quality of the habitat, the presence of other sport fish, the extent of stocking, and the amount of exploitation by recreational fishing. Therefore, successful lake trout management requires carefully considering the ability of each population to sustain harvests and maintaining annual harvests within acceptable limits.

Canadian studies, and observations from heavily fished Maine lake trout waters, indicate that annual yields in excess of 0.45 pounds per acre from wild populations cannot be sustained without jeopardizing many of these populations. Depending on the size and age class structure of the population, acceptable annual harvest rates may be lower than 0.45 pounds per acre, and sometimes even lower than 0.25 pounds per acre. Populations with an abundance of mature wild fish demonstrating slow growth should be harvested at lower rates than those with large standing crops of small fish or those with fast growth.

Higher annual yields, perhaps as high as 1.0 pound per acre in some waters, might be expected from populations sustained by stocking. However, if establishing a self-sustaining population is the objective of stocking, harvest should probably not exceed an annual rate of 0.45 pounds per acre. Sound management of all lake trout populations, whether wild or stocked, must carefully consider the capacity of individual waters to produce sport fish and sustain harvests of all species on an annual basis. For both wild and stocked populations, harvest rates at less than maximum sustainable levels should, in time, lead to increases in the number of older-age lake trout. This would eventually result in more larger-than-average-size (i.e. trophy) fish if suitable forage were available and not a limiting factor.

Habitat Protection

Because lake trout prefer the deep, coldwater lakes with excellent water quality at all depths, in order to maintain lake trout populations it is important to protect their habitat. This begins with protecting watersheds and shoreline areas to prevent influences that would degrade water quality. As lake trout spawn in the fall in very shallow water, it is essential to protect this spawning habitat if self-sustaining populations are to be maintained. Dams are present on the outlets of 63 (46%) of Maine's 137 lake trout waters. Of these 63 dams, 54 hold several feet or more water, enough to influence the success of lake trout that spawn in shallow water along the shore. In order to generate hydroelectric power, and/or to make room to capture the following spring's runoff, storage from most waters with dams is withdrawn during the winter months. The Fish and Wildlife Department has a long-standing policy that advocates protecting lake trout spawning by establishing and specifying water levels adequate to cover spawning areas that have been identified. To assure the success of natural reproduction, the policy recommends that withdrawals to this level should be completed prior to spawning in October. Throughout the following winter the water level may be managed to both rise and

fall, provided it does not drop below the elevation established for spawning. To date, there are active fall drawdowns agreements at 29 (54%) of the 54 dams on lake trout waters.

A deep-spawning strain of lake trout from the Finger Lakes in New York has been introduced into a few Maine lakes where winter water level fluctuations were an important concern, in hopes that these fish would maintain their deep-spawning characteristics. Although these fish have reproduced successfully in some waters where they have been introduced, most notably in Sebago Lake, to date deep spawning has yet to be documented in Maine. In fact, in Sebago Lake these fish have spawned very successfully close to shore at depths ranging from 6 to 16 feet.

Forage Introductions

Forage enhancement successes utilizing the opossum shrimp (Mysis relicta) were widely reported in fishery literature in the early 1970's. At that time it was noted that these macro invertebrates utilized detritus as a food source and therefore recycled nutrients in providing excellent food for trout and salmon. Studies since that time have revealed that in their new habitats these invertebrates also consumed large zooplankton species such as Cladocerans. Many introductions, especially in very deep, single basin lakes in the western United States, had disastrous ecological consequences.

In waters where the two species occur together naturally, the opossum shrimp is very important in the diet of Canadian lake trout. Therefore, in the mid 1970's opossum shrimp were introduced into several Maine lakes as a source of forage for young lake trout. It was hoped that by living in the deepest water of these lakes, and feeding on accumulations of detritus there, they would improve lake trout growth and survival and help to increase production in our nutrient-poor lakes. Success at establishing a self-sustaining population of opossum shrimp has been achieved only at Moosehead Lake. The importance of this forage to young lake trout in Moosehead; however, has yet to be determined. Winter food habit studies to date have not found opossum shrimp in the stomachs of legal-size (>14 inches) lake trout harvested by ice fisherman. Summer netting studies of lake trout as small as 8 inches indicate only occasional use of opossum shrimp. Other species, such as cusk and smelts, appear to utilize them more frequently, but they are not a major component of their diets.

Recent studies of the opossum shrimp in Moosehead Lake indicate that, although present throughout the lake, they are not very abundant. Apparently, Moosehead's physical, chemical, and biological characteristics have not been conducive for this invertebrate to become very abundant or produce any of the devastating effects that have been observed as the result of introductions in western states. Nevertheless, prudence dictates that until the role of the opossum shrimp in

Moosehead Lake's ecosystem is fully understood, there should be no further introductions of Mysis relicta into Maine waters.

It is likely that smelts did not occur naturally in most, if not all of Maine's native lake trout waters. Based on food habit studies of lake trout from Canadian waters without smelts, from Maine waters before smelts were introduced, and from Maine waters presently without smelt, lake trout rely on a variety of indigenous species as forage. Most notable among these is the lake whitefish. However, as the distribution of smelts increased after the late 1800's, it became common knowledge that where smelts were abundant in lake trout waters, lake trout always appeared in excellent condition. Where smelts were absent, or present only in low abundance, lake trout often appeared long and lean, with large heads. Because of this smelts have been widely introduced, both legally and illegally, into most Maine lake trout waters to enhance the forage base, often with little or no consideration given to the environmental consequences.

At present smelts are found in 123 (93%) of Maine's 137 lake trout waters. Of the 14 waters remaining without smelts, 12 are located in the remote areas of northwestern and northern Maine. There is evidence that lake trout which depend on smelts as their principal forage mature at larger sizes and older ages than those that prey on traditional indigenous foods. As lake trout will survive on other forage fish species, smelts should not be introduced to any of the remaining 14 lake trout waters where they are not present, at least until the environmental consequences of such introductions are more fully understood.

Where smelt populations have declined, it has been a common management practice to augment these populations by stocking adults or eggs obtained from other waters. Because of the potential for introducing diseases and parasites by moving adults, especially the parasite Glugea hertwigi, a Fishery Division policy prescribes that only eggs, which can be treated for Glugea, may be transplanted. Smelt eggs are transferred to augment existing populations in the short term, or to establish or enhance spawning runs. However, when low smelt abundance is a chronic problem, continued stocking of smelts is a questionable management practice. In that situation the problem of low smelt abundance should be addressed by first identifying, then correcting, the factors which limit smelt abundance. For instance, if too many predators rely on smelts as their forage base, the solution is to manage the predators appropriately, and not to rely on an artificial feeding program that maintains both predator and prey populations at levels above the natural ability of the body of water to produce and sustain either.

Age and Growth

Growth can be defined as an increase in size, either length or weight, over time. Therefore, determining fish growth rates requires knowledge of the age of the fish. An easy and usually reliable method of obtaining growth information from Maine lake trout has been through stocking hatchery-reared fish that were

marked by fin excision prior to their release. For the past 30 years, all lake trout stocked in Maine have been marked both to distinguish them from wild fish, and to assist in determining their age.

The age of unmarked, wild fish can be determined using a variety of methods. Determining ages from scales samples is perhaps the most common method of aging most salmonids. However, the annual growth patterns on lake trout scales do not lend themselves to easy interpretation, especially for mature fish age 6 and older. Otoliths, calcareous structures located within the inner ear of fish, provide a far more reliable means of determining lake trout ages. Utilizing otoliths to determine lake trout ages in Maine began in the mid 1980's.

The following table compares the average length at each age of 844 wild lake trout and 560 stocked lake trout sampled in Moosehead Lake. The wild lake trout were sampled during the 12-year period 1989-2000. All were aged using their otoliths. The stocked fish were sampled over a 21-year period 1971-1991, and all ages were determined on the basis of the marks (fin clips) the fish received prior to stocking. Although growth at Moosehead is a little slower than has been observed on other Maine waters, it is certainly typical of a northern Maine lake trout population.

Moosehead Lake – average length in inches at each age (sample size)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
Wild	5.8	9.4	12.5	14.4	16.1	17.5	18.9	20.0	19.6	21.1	20.5	21.0	23.2	25.0
	(7)	(130)	(166)	(226)	(137)	(77)	(36)	(9)	(14)	(10)	(11)	(17)	(3)	(1)
Stocked	6.9	9.1	11.8	16.0	18.4	18.9	19.5	20.0	20.9	22.1	21.3	23.1	-	-
	(3)	(8)	(30)	(40)	(102)	(156)	(114)	(53)	(27)	(13)	(11)	(3)		

Stocked fish are generally larger at each age than the wild fish. Fish raised for a year in the hatchery environment have a distinct size advantage over fish that must fend for themselves in the wild. Annual growth for both stocked and wild fish is faster prior to maturity, which usually occurs between ages 5 and 8. From age 1 through age 5, wild lake trout in Moosehead grew an average of 2.6 inches per year. After age 5, their average annual growth slowed to slightly less than an inch per year. Likewise, from age 1 through age 5, lake trout stocked in Moosehead grew an average of 2.9 inches per year. After age 5, their average annual growth slowed to about 0.7 inches per year.

Growth information comparing wild lake trout sampled from Sebago Lake in 1996 with stocked lake trout sampled during the period 1974-1980 reveals a trend similar to that observed at Moosehead Lake. At Sebago; however, the average lengths of both wild and stocked fish at each age are generally a couple of inches longer than the length of Moosehead Lake lake trout.

Sebago Lake – average length in inches at each age (sample size)

	I	II	III	IV	V	VI	VII	VIII	IX
Wild	7.4 (1)	11.9 (7)	14.3 (11)	16.5 (11)	18.4 (25)	19.5 (15)	20.3 (3)	21.3 (2)	18.8 (1)
Stocked	-	-	15.9 *	17.0 *	18.3 *	21.3 *	22.2 *	24.4 *	27.0 *

*information on sample sizes not available

These tables indicating average lake trout lengths at each age do not show the very wide variation in lengths that occurs in lake trout at any given age, and growth rates vary a great deal among individuals. Furthermore, the variation in length at each age ranges from as little as 4 inches, to as much as 8 inches, and even more in some populations. Because of this, the oldest lake trout caught are not always the largest ones.

In most lake trout populations the majority of adults appear destined to grow no longer than 21 to 24 inches. However, in each population a few individuals appear to have the potential to attain a much larger size. To do so they must feed more aggressively. Therefore, they are also the most likely to get caught and removed from the population before they have an opportunity to attain all of their potential growth. Nevertheless, a few do escape fishing during their early years, and these become the real trophies that are reported each season.

Condition

The condition of a fish is a description or measure of its relative plumpness or robustness, usually in relation to an established standard. Determining the condition of a fish requires knowing the weight of each individual for which a length is available, regardless of age. For each species a standard can be developed that represents all populations over its natural range, all populations in a particular region, or a population in an individual body of water at a particular point in time.

An equation to determine the standard weight of lake trout that can be expected at any length has been calculated using information from hundreds of lake trout of all sizes from 58 typical North American lake trout populations. Lengths and weights from populations in 9 American states and 5 Canadian provinces were used, including 15 Maine lake trout populations. Here in Maine, as throughout their range, lake trout vary widely in condition, depending on the productivity of their habitat, their abundance in a population, and most importantly, the type and amount of forage available to them. Populations with a wide range in condition were represented in Maine's contribution.

The following table indicates the standard weights that can be expected, on the average, at each length in populations that demonstrate the range of lake trout condition in Maine, as well as the standard weights calculated at each length using the equation for all lake trout population in North America.

	Standard weight in pounds calculated for each length								
	18”	19”	20”	21”	22”	23”	24”	25”	26”
28”	30”								
Maine Low (Embden L.)							1.86	2.18	2.53
2.92	3.35	3.81	4.31	4.86	5.45	6.76	8.27		
Maine Average (15 waters)				1.91	2.27	2.67	3.11	3.61	4.15
4.75	5.41	6.12	7.74	9.64					
Maine High (Spider L.)									
2.15	2.55	2.98	3.47	4.01	4.60	5.25	5.95	6.72	
8.45	10.46								
North American Standard (58 waters)									1.98
2.36	2.79	3.27	3.80	4.39	5.04	5.76	6.54	8.32	
10.41									

The information in this table can be useful in assessing the condition of lake trout in any Maine population. It can also be useful in determining lengths that might be appropriate if management for larger-than-average lake trout is an objective. In this latter case, it is apparent that a fishery to produce lake trout averaging over 5 pounds involves fish from 24 to 26 inches and longer in length. Taking into account the growth of lake trout in Maine, in most waters such a fishery would involve lake trout that, even with the fastest growth, would be 8 to 10 years old, and older.

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Maine Department of Inland Fisheries & Wildlife
Landowner Relations
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Augusta, ME 04330
207-287-8091

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We urge all hunters and anglers to *Supersport* their license. The fee is only $15.00 and all proceeds fund the Maine Department of Inland Fisheries & Wildlife's vital Landowner Relations Program. Thus far, this program has helped prevent the posting of over *63,000 acres* of private land. If you have already purchased your license, you may still become a *Supersport* at anytime.

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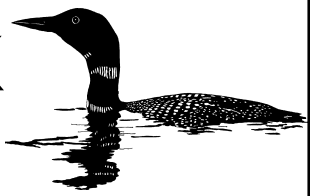

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Lead sinkers & jigs cause fatal lead poisoning in loons and other waterfowl.

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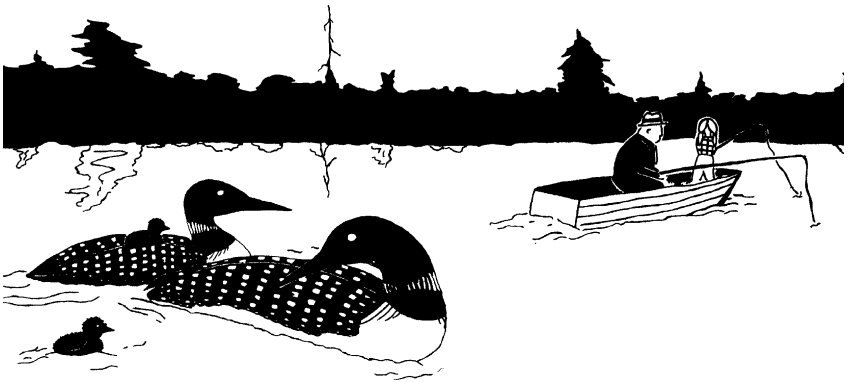

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Ask local tackle shops to stock alternatives.
Properly dispose of old lead sinkers and jigs.

Maine Department of Inland Fisheries and Wildlife